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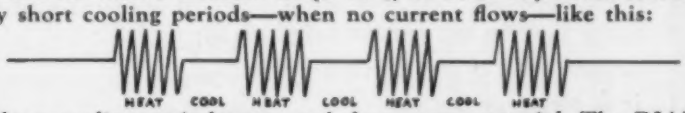

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American Journal
of
ORTHODONTICS

VOL. 34 MAY, 1948 No. 5

Original Articles

PRESIDENT'S ADDRESS, GREAT LAKES SOCIETY OF ORTHODONTISTS

S. STUART CROUCH, D.D.S., TORONTO, CANADA

PROBABLY you all know the quotation taken from a brass plate in a Chinese garden: "Enjoy yourself, it is later than you think." It expresses my hopes and feelings for this meeting of the Great Lakes Society.

Had it not been for the war I should have been in this office in 1944. It was a long finger that wrote those words, and it seems to me that it was a group of long fingers which have drawn us here as members of this Society. Our past meetings have proved that the "frontiers of knowledge are neither East and West nor North and South, but rather wherever a man fronts a fact."

Some of the facts we are fronting are:

1. New and advanced knowledge of the growth and development of the human head.
2. Increased need for orthodontic service as recognized by the general public.
3. The tendency toward socialized health services, and our place in any such program.
4. A rapidly growing appreciation of our work by other branches of health service, and a consequent need for increasing our general knowledge in order to work more intelligently with them.

I am sure you will agree that we have a splendid program and I desire to express your thanks and my own to the Board of Censors, the executive and local committees who are responsible. Especially should I mention the Secretary, Dr. C. Edward Martinek, who has so efficiently done most of the work for several years.

We live in a changing world. Perhaps more rapid and more far-reaching changes are taking place than at any other period in history. Dental education and practice have been markedly affected and orthodontics perhaps more than any other branch of the healing art.

Presented at the meeting of the Great Lakes Society of Orthodontists, Toronto, Canada, October, 1947.

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The day has arrived when much more and better academic training in orthodontics is essential for adequate practice than most of us have had. Dental faculties are recognizing this, and are gradually providing the means for filling the need. Therefore, I agree with the proposed constitutional changes as regards membership qualifications which require such training, as well as practical experience, but feel we should accept applicants who show a genuine interest without having had such complete training and experience, until it can be adequately provided by the teaching institutions.

In my opinion these should be admitted after careful study and consideration of individual training, ability, and experience.

In this connection, may I quote from the presidential address of Dr. Brooks Bell of Dallas, Texas, President of the Southwestern Society of Orthodontists:

> 1. None of us wants to see the short-term course of ten to sixteen weeks to return, though I venture that 90 per cent of us had our primary orthodontic training in such courses.
>
> Is it not feasible, however, for the dental schools to break down their courses into units so that instead of a continuous session it will be possible for those desiring orthodontic education to attend school four months and then return to their practice for a like period of time, return for the second unit of instruction of four months followed by a return to practice for the same period of time, and then return for the third and final unit of instruction.
>
> The danger of such an arrangement, of course, is that after receiving two units of orthodontic instruction, students might be prompted to assume cases without completing the course. Possibly such action might be prevented if it became general knowledge that membership in recognized orthodontic societies would be obtainable only by persons who have been awarded a certificate for a completed graduate or postgraduate course in a recognized dental school.
>
> Another approach to the problem might be that of setting up in each component society a teaching commission whereby a man would spend four months with one member of the commission and then return to his practice, come back in four months for another four months' session with another member of the commission, then pick up his practice again for four months, and finally come back for the final four months' session with a third member of the commission.
>
> This, of course, involves a great deal of additional work on the part of the members of this teaching commission, and also involves a highly personal element. A problem that is confronting dentistry as a whole is that of controlling the overnight specialization that has sprung up during the last four years. This has not been particularly true in orthodontics inasmuch as it has long been recognized that orthodontics is one branch of dentistry which requires not only unusual skill, but unusual knowledge which cannot be quickly acquired. The high standard of orthodontic training now existing has been brought about by the general practitioner's demanding that those specializing in orthodontics receive proper training over a period of nine to twelve months. In other branches of dentistry, however, it is possible to become a "specialist" in an unduly short time. I think, therefore, that we, as specialists in orthodontics, should work with the specialists in the other branches of dentistry and enact a specialists' law in our various states. Oklahoma is the first state in our Southwest to have such a law. A specialists' law would in no way prevent a man from becoming a specialist but it would make possible legal control of the amount of training he should have before he could announce himself as a

specialist. This would work, of course, to the benefit of the public, inasmuch as they could be assured that every man announcing himself as a specialist was qualified as such.

One other piece of legislation that we, along with the pediatrician and eye, ear, nose, and throat specialists, should sponsor is providing for excused absence for dental and medical appointments without the patient's being penalized by being counted absent or tardy. This law is already in effect in many states. I recommend that the Public Relations Committee take action to bring about such legislation in the Southwestern states.

Some states in our Great Lakes jurisdiction and the province of Ontario have such laws already in operation. I would recommend that our members endeavor to have similar laws placed on the statutes of their respective states if this has not already been done.

I would like to suggest that those who have not been certified by the American Board of Orthodontics apply for certification. The Board is constantly striving to elevate the standards of orthodontics by the requirements it sets for those applying for certification. I particularly urge the younger men just starting in orthodontics to begin to prepare themselves for the Board. The requirement of the Board is that one must be in the exclusive practice of orthodontics for five years before he can apply for certification. The Secretary of the Board is always glad to state the requirements for individual cases.

There is much difference of opinion regarding the teaching of orthodontics to the undergraduate in dentistry. I have my own personal views, but will not thrust them upon you beyond saying that I believe a graduate should go out into general practice with the ability to recognize the abnormal and at least determined to recommend adequate examination by a specialist, if necessary, and able and willing to practice a few of the simpler operations which would go far toward preventing probably 50 or 60 per cent of the grosser malocclusions.

There are still widespread misconceptions regarding orthodontic treatment both among dentists and the general public. Two of the most common of these are regarding caries and the results to be obtained from such treatment. Many dentists still blame the wearing of appliances for causing dental disease. My feeling is that, with modern appliances and the frequent visits to the orthodontist, conditions are observed earlier and more severe pathology is prevented. Teaching institutions should emphasize this to undergraduates, and dental journals should frequently point this out. I recommend that we should, individually and as societies, publicize this. We should also inaugurate some type of educational publicity in newspapers and magazines. Some large commercial companies are doing some of this and the publishers are usually willing to give space to such matter.

Ohio dental authorities have made and are making a splendid contribution. They have published a pamphlet entitled "Control of Tooth Decay" of which hundreds of thousands of copies are being distributed and have recently brought out a series of colored slides of great interest and educational benefit. Our own past president, Dr. Henry D. Cossitt of Toledo has contributed largely to these efforts and can give you further information if desired.

Many of us were brought up under the Angle school of thought which demanded ideal occlusion as the objective of treatment. It is sound practice to have the ideal as our objective, but we must admit that it is impossible of attainment in perhaps a great majority of cases. Even so, great improvements can take place with moderate treatment, and it is my opinion that we should not refuse treatment because we cannot hope for the ideal. When nature has failed, we cannot hope to do more than be of some assistance.

My suggestion can be illustrated by the story of the boy with a bantam hen who placed a large goose egg in the nest with the sign above it which read, "Watch this and do your best."

Let us know the ideal and strive for it, but realize it is impossible of attainment in many mutilated and other cases, but we should not refuse treatment because of difficulties.

Before closing, may I pay tribute to the publishers and editors of the AMERICAN JOURNAL OF ORTHODONTICS. They have worked under many difficulties and criticisms, and I believe that the recent decision to publish separate journals for orthodontics and oral surgery is a distinct forward step.

As a final word, may I again express thanks to all who are working for improvements in orthodontics generally and our Society in particular, and bespeak for my successors the same help and cooperation as has been given in the past in spite of all the difficulties. The real sources of joy in life are not the result of easy tasks, but of hard ones.

Let us not flinch or fumble, but
Let us all hit the line hard.

86 BLOOR STREET, WEST.

THE ART OF ORTHODONTIC PRACTICE

ANDREW FRANCIS JACKSON, D.D.S.,* PHILADELPHIA, PA.

LAST year Dr. Lowrie Porter presented one of the finest *practical* papers before the Great Lakes Society that I have ever read. It was so good that I have been stimulated to my greatest efforts to approximate his standard in order not to disappoint you. Dr. Porter's paper was published in the March issue of the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY. It, together with several other articles of a highly controversial nature, makes this one of the most interesting issues of the JOURNAL ever published.

I hope that everyone has read this March issue through as some of the material, and particularly Dr. Porter's saneness of judgment, has been of great help in preparing this article. The symposium on extractions is of particular interest in that it contains variations of opinion on the subject ranging from one-eighth of 1 per cent, which in terms of percentages is below the alcoholic standard of "near beer," to 75 per cent to 90 per cent which by comparison is equivalent to a shot of straight rye without even so much as a chaser.

In that issue, also, appeared two highly scientific papers by Dr. Wendel Wylie who also was an essayist on the program of the Great Lakes Society in October, 1947. I have read Dr. Wylie's articles over several times with intense interest, not only for their scientific erudition and value to orthodontics, but for the delightful vein of humor in which they are written. I think that one of the most important requisites of a good scientist is to have a sense of humor.

I am fully aware of the fact that in the minds of some the emphasis with which I was asked to present a "practical" paper is a rather dubious compliment. I would like to make it clear, however, beyond the shadow of a doubt that this is the highest compliment which can possibly be paid to any orthodontist. In order to be "practical" it is necessary to make important *decisions* and their merit depends not only on a somewhat extensive range of necessary information, but also on the scope of imagination and judgment with which they are made. In order to make as clear as possible what this means, I have made a diagrammatic sketch of what the field of orthodontics covers (Fig. 1).

Orthodontics starts with the *infinite* which is completely incomprehensible to the human mind, but out of which emerges the life of some specific human being, our patient. In order to appreciate man's relation to the universe it is necessary for an orthodontist to have at least a speaking acquaintance with anthropology. A specific individual is the direct result of his own peculiar heredity and environment, and this involves some knowledge of genetics (particularly the results of hydridization), embryology, nutrition, and hygiene. As

Presented at the meeting of the Great Lakes Society of Orthodontists, Toronto, Canada, October, 1947.

*Professor of Orthodontics, Temple University.

growth and development progress, infinite variations occur in the sizes, relations, and proportions of the parts concerned, and also infinite variations occur in the muscular and mental functions and reactions of the individual, so that it is necessary to have a well-rounded knowledge of anatomy, physiology, and psychology. During the lifetime an individual is also subject to certain vicissitudes of life which may profoundly alter form and function such as diseases, glandular disturbances, or unbalance, and ordinary accidents of life, so that it is also necessary to have some considerable knowledge of pathology and endocrinology together with an appreciation of the resultant effects of traumatic injuries. As a result of the action and interaction of all these factors, there emerges at the end of all these processes a human dental occlusion which in ordinary concepts may be considered ideal, normal, individually normal, or abnormal.

The mass of scientific information involved in all these subjects is already sufficient to fill a library and yet the whole of it, even supposing that it could be crammed into one brain, is not sufficient to get an orthodontist to first base. A "practical" orthodontist has to be more than a scientist. He must also be a bit of a philosopher. The great Sweedenborg said two hundred years ago, "Knowledge without reason, a vast mass of things in the memory without judgment to separate and clearly distinguish them, and without the *talent* of deducing the unknown object of inquiry from certain known data by means of a rational analysis, in a word the possession of the means without the faculty of arriving at the end, does not make a philosopher."

Philosophy has many definitions, among them a "reasonable attitude" chosen by Dr. Ashley Howes as adequate for orthodontic purposes. It involves "deductive logic" and plain "common sense." The application of these qualities to our scientific knowledge will carry an orthodontist quite a long way, possibly as far as second base. Something far more important, however, which can only come under that rather indefinite but all-inclusive term known as "art," is still needed. The definitions of art are sufficient to fill a volume. For purely "practical" and absolutely necessary purposes, they include the qualities of "creative imagination," "inventive ingenuity," "intuitive perception," and very highly developed forms of natural and acquired skills. Science, philosophy, and art are complementary and absolutely necessary to each other. They all start together, but the genius of art is the only one that provides the punch to drive the others over the home plate. I have made a diagram of these terms, their definitions, and my idea of their relations and proportions to each other.

As can be clearly seen, the factors involved are numerous, impossible of exact scientific appraisal or calculation either singly or in their relations to an all-inclusive whole, and never quite predictable in their reactions to forces which disturb their natural anatomic and physiologic equilibriums.

To omit from consideration or miscalculate a single factor of this complex, to overemphasize the importance of one or more of them and disregard others as a basis of diagnosis and treatment is untenable scientifically, philosophically, and artistically. The mistaken concepts arising from this fundamental error constitute the reason for the confusion and the intolerant differences of opinion

which exist between orthodontists at the present time. This is one of the commonest forms of human stupidity. Theologians have done the same thing with the Christian religion.

It has been said that the main difference between men and their accomplishments as enduring contributions to progress is a question of perspective—the ability to take the big view, to see things in their true relation to a broad and comprehensive whole, *the ability to resolve a problem to a single mental picture.* This is a very rare gift and something quite apart from mere education. It contains the element of greatness. It is the first essential in the make-up of every true artist and no really good orthodontist can possibly be without it.

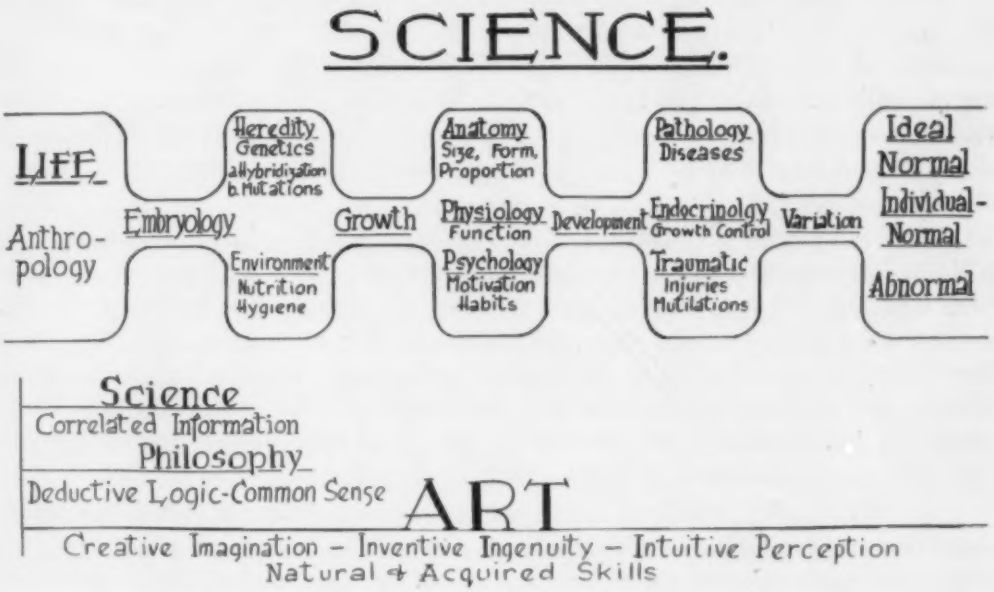

Fig. 1.

Judgment is based on the easily understandable process of observation, comparison, and deduction. It is the basis of art, science, and philosophy. Within certain circumscribed limits and carefully selected material, almost any theory can be made to appear plausible and amenable to fixed rules or systems of procedure. This is the great delusion which many orthodontists have fallen for. Nature, however, does not confine herself to any circumscribed limits of variation, but seems to enjoy the sport of producing unusual and invariably original combinations.

Every orthodontic case is inevitably and invariably unique in its original structural and functional pattern. The final result of treatment must, of necessity, likewise be unique, and the steps involved in making the changes which seem obvious and desirable should also be unique. Far from adhering to any hidebound technique which is totally incompatible with infinite variation, the more originality which can be shown by the orthodontist in visualizing his final objectives and his flexibility of mind in utilizing the means at his command to

obtain these changes, the better will be the treatment. A good artist of any kind is known by the scope of his imagination in planning or conceiving his objectives and the simplicity and directness of his moves in carrying them into effect. All great painting, music, writing, and other forms of art, have these qualities in common. Orthodontics is fundamentally of the same nature.

To think for one second in terms of exact measurements or definite anatomic landmarks is to step squarely on the flypaper of error and confusion. Everything concerned with *infinite variation* can only be *relative*.

The stature of an orthodontist, like any artist, can only be shown by clear demonstrations of his work.

Case reports, showing treatment which is based on "principles" of universal application and presented in full detail are the equivalent of paintings, musical and literary compositions, and other forms of expression, by which the mental caliber, technical skill, and artistic feeling of the orthodontist can be appraised. A comparison of *results* is the only method of evaluating both the merit of the means employed and the ability of the orthodontist to carry them into effect.

The real source of pleasure of any true artist consists in exercising the skills he has acquired. It is practically impossible to keep an artist of any kind from working. That is where his main source of pleasure lies, long after he has lost any pecuniary necessity or professional ambition for continuing. The artist Renoir became so crippled in his old age by arthritis that he had to have the brushes tied to his hands, but he kept on painting to the end. The urge to do something just a little better than it has ever been done before contains an element of personal satisfaction which cannot be denied.

In orthodontics, material upon which to pass judgment and formulate objectives and methods of procedure is as plentiful as the air. By making some simple comparisons of cases of *extreme variation*, some logical and irrefutable conclusions start to drop like ripe apples off a tree.

As much of the confusion which exists in orthodontics seems to stem from a misunderstanding of some of the commonest terms, it might be well to start with a consideration of a few of them.

THE MEANING OF "SATISFACTORY" DENTAL OCCLUSION

The purpose of orthodontics is to improve the functional efficiency and esthetic harmony of the teeth and surrounding tissue—to convert unsatisfactory dental occlusions into more satisfactory ones.

There is a Chinese saying that "wisdom begins by calling things by their right names." The word "satisfactory" is specific enough to begin with and easy enough to understand. A "satisfactory" dental occlusion consists of one in which there is a balanced proportion of tooth substance to bony development, an efficient functional excursion of the mandible, and a pleasing facial appearance. These attributes can be termed *structural balance, functional efficiency,* and *esthetic harmony*. All unsatisfactory conditions can be simply and clearly classified under one or more of these headings.

In a world population of some two billion human beings, there are, according to the foregoing definition, probably many million satisfactory dental occlusions, all of them different, however. In man, the most fantastically complex and variable organism in the universe, the past and actual number of occlusions combining these desirable attributes are for all practical purposes *infinite* in number.

A *qualitative* classification is the only one that is commensurate with *infinite variation.*

The *opinion* as to what constitutes the most satisfactory occlusion for any specific individual, combining the three qualifications, structural balance, functional efficiency, and esthetic harmony, resolves into an artistic equation of the most subtle order and is inescapably a matter of personal judgment.

NATURAL OCCLUSIONS

The first concern of the orthodontist should be to have an understanding of how unsatisfactory occlusions occur and to have at his command a sound and all-inclusive basis upon which to formulate judgment as to what should be done about them. This is the pivotal point upon which everything depends.

Studies of anatomy indicate that a human being should have thirty-two teeth. On this basis it can be safely said that an *ideal* dental occlusion consists of one in which the qualifications which have been indicated combine in the presence of thirty-two perfectly formed teeth. Every dental graduate is familiar with the characteristics of an ideal occlusion.

There does not seem to be the slightest logical reason why an *ideal occlusion* should be called "normal" or set up as the objective of orthodontic treatment.

It can be *demonstrated* on the simplest and soundest basis of logic and common sense, and with a minimum of artistic perception, that an *ideal* or so-called "normal" occlusion is for some individuals the most undesirable arrangement that could be devised for them, and in many cases completely impossible to attain. The number, orientation, and relation of the teeth are only details of a much more comprehensive problem.

Perhaps the most commonly used, least understood, and, unfortunately, applied term in orthodontics is the word "normal." What is normal? As applied orthodontically *normal* is an *average,* within arbitrarily circumscribed limits, of the specifications of a group. The larger the group, the greater the difficulty to determine this. Normal of a group is what there happens to be the most of, whether we consider it satisfactory or not. Bimaxillary protrusion, for instance is typical and "normal" for the Negro, but it is not typical, normal, or desirable for members of the white race.

It is quite possible that there are more *unsatisfactory* dental occlusions in the human population than there are satisfactory ones, and, if this is the case, then it is quite *natural* and *"normal"* to find some degree of malocclusion of the teeth in almost everyone. We seldom find perfection in anything, least of all in members of the human race.

Within certain groups, ugliness and inefficiency are looked for and considered "normal." The characteristic occlusion of the bulldog is typical for that

specie of animal. It is mainly the result of his own peculiar heredity which, under satisfactory environmental conditions, develops into what can be termed his *"individual normal."* It is the best that Nature could do with the material. Comparative anatomy would quite rightly say that it is an unsatisfactory and atypical occlusion. The important point, however, is that the only way that the unsatisfactory occlusion of the bulldog can be reproduced is through *selective breeding.*

The typical malocclusion of the bulldog, the bimaxillary protrusion of the Negro, as well as any other characteristic features of a group, become established through homogeneity of propagation and environment over long periods of time.

The profound significance of hybridization cannot be overestimated in its influence on resultant genetic patterns. The peculiar form of the dachshund constitutes its *own peculiar "genetic pattern"* or *"individual normal."* Orthodontic treatment consists to a great extent in altering "individual genetic patterns" which are unsatisfactory.

Experiments on dogs have shown what was to be expected, that *crossbreeding* of different types of animals produces some most peculiar and "unsatisfactory" individuals. As this is precisely what has been going on for some considerable time and recently at an unprecedented rate in the human race, Brash has defined orthodontics very well when he says that it is "the experimental control of the experiments of nature."

The heredity of the individual overwhelmingly outweighs every other determining factor of his make-up. Regardless of how unsatisfactory a dental occlusion or any other feature of the individual may be and how it may differ from the average of a group or any other specific individual, it is in its *original, undisturbed* condition and under satisfactory developmental environment, the *"individual normal."* This has nothing to do with what we think it should be, or would like it to be.

The term "individual normal" has been used somewhat ambiguously in orthodontic literature. If there is any argument about the meaning of the term, we can still get along quite nicely for all practical purposes with the simple term *"natural."* It still stands that our efforts in orthodontics are concerned with altering *"natural" occlusions* into *something different.*

Orthodontics owes its existence to the fact that some of these so-called "individual normal" or "natural" occlusions are so unsatisfactory that there is an insistent demand by their unfortunate possessors for something to be done about them.

Orthodontic treatment consists, therefore, in a large percentage of cases, in interfering with perfectly "natural" and "individually normal" but unsatisfactory dental occlusions and altering them, by natural and artificial means, into arrangements which are both *unnatural* and *individually abnormal* but more *satisfactory* for the specific individual for whom the changes are made.

ORTHODONTICS NOT AN EXACT SCIENCE

Heredity and environment determine the characteristics of everything that lives. Growth and development terminate in a state of fairly stable balance. Permanent changes in nature can only be attained when the forces, both natural

and artificial, which have been employed to influence the *course of natural growth, alter function, and produce physical readjustments* terminate by leaving the tissues in a new state of balance.

Everything that is done orthodontically is an aid or a *compromise with nature.* All the changes that are made are actually *in direct opposition to the original plan of nature.* Relapse is natural and to be expected as it is simply a resilient effort, by the forces and elements which have been disturbed, to revert, both in form and function, back to the original pattern.

There is no duplication in nature; therefore, there cannot be any duplication in orthodontics either in the individual objectives of treatment or methods of achieving them.

Infinite variation is the first and most important single fact to be borne in mind constantly. Every phase of orthodontics must necessarily be predicated on this basis. There is no room for stuffy classifications which are based on one or more factors which bear but a relative value to a comprehensive whole.

In view of the scope which orthodontics covers, it is well to scan it with what Dr. Ernest Albert Hooton might term "olympian detachment." As anthropologists have the habit of doing just this thing, it is well to consider at the outset what some of them have to say. Fortunately, one of them at least has not lost his sense of humor! The same Dr. Hooton of Harvard University said, "Anthropology reveals many things which most persons prefer not to know, since it harps upon humble and even bestial origins, regards the present status of our species without approbation, and can predict for the men of the future no apotheosis but only a multiplication of psychoses, dental caries, malocclusions and fallen arches, together with a full retention of his aboriginal cussedness." Dr. Hooton also doubts whether man's evolutionary status has improved appreciably since the end of the glacial ages and believes it will get worse unless "the reckless and capricious breeding of protected inferiors" is stopped. I think Dr. Hooton is unduly pessimistic; nevertheless, looking at the matter purely from the point of man's dental occlusions, Dr. Hooton does not go far enough. It is quite obvious to any observing orthodontist that there are many *superior* types of human beings with very unsatisfactory dental occlusions which can only be attributed to unfortunate genetic matings.

All this is really very complex. Another anthropologist, Dr. Ashley Montague, however, had a few encouraging words to say:

> Facts do not speak for themselves, but must be critically evaluated. You may think that in order to evaluate the facts you need to have a great deal of knowledge. *But the truth is that all the really fundamental things of life are quite simple, and there is nothing hard* to understand or difficult to do about them. The trouble is not with the fundamental facts but with the countless errors confused with fact, presented to you as fact, and so accepted, if not by you, by large numbers of people.

Within certain limits of variation almost any *theory* can be made to look plausible.

Man tries desperately for *some system* by which variations can be neatly catalogued and relieve him of the responsibility of personal decisions.

Nature, however, knows nothing but infinite variation, much of it extreme to a degree and in most unusual combinations.

Try as we will, infinite variation can only be dealt with successfully by the application of *principles* applicable to all cases and to all reactions and interactions concerned with them. That is why the gloomy Dean of St. Paul's said of the greatest teacher of them all, "He never wrote a book or made any laws, but laid down a few simple *principles* applicable to everybody." There is something fundamental about this.

POSITION OF OCCLUSAL PREFERENCE

The essence of any problem consists in knowing *what* to do, *when* to do it, and *how* to do it.

As in orthodontics, we are dealing with living sentient human tissue which, when under treatment, is in a constant state of flux, it is mandatory to have instantly at one's command the means to *glimpse* at least an *all-inclusive picture* of a situation on which to base judgment. This is the crux of the matter, the pivotal point from which everything radiates.

An orthodontist must of necessity "visualize" what he wants to do. He should be able to see clearly, from every angle and viewpoint, the exact status of a condition as it *is* in its *entirety* and be able to compare this with a more desirable arrangement which, in his imagination and judgment, is possible of attainment by means of orthodontic procedure.

An orthodontist may well ask *what* or *where* is this vantage point from which the whole panorama may be scanned. He will do well not only to think about this, but if once accepted by him to give it priority over every other single thought connected with the clinical practice of orthodontics.

In my opinion, Dr. Alfred P. Rogers was the fortunate man who indicated the nearest approach to this vantage point when he coined a term in connection with his contributions to myofunctional therapy. That it had anything to do with myofunctional therapy is purely incidental, whether Dr. Rogers realizes the far-reaching importance of his basic concept or not.

Rogers' idea consisted in directing patients to place their jaws in the position *which, visualizing the result at the end* of treatment, seems the most desirable from the standpoint of function and esthetics. This is the simplest and most direct method of visualizing in their entirety the changes to be contemplated. He called this the position of "*mechanical advantage.*" The term "*occlusal preference*" might be more descriptive and specific. We might compromise with "occlusal advantage." However, whatever term is used, the important question is, "What means have we to determine exactly what this position is?" In actuality it is, *of necessity*, an *arbitrary position*, based entirely on the judgment of the clinician. It can be one of many, but should again be the one which all the factors of the case indicate as the most desirable from the objective standpoint of structural balance, functional efficiency, and esthetic harmony in the finished result.

As with every phase of orthodontics, this is subject to infinite variation, judgment on which can only be tempered by common sense and artistic feeling,

plus the ability of the clinician to estimate, *from past experience,* the limits that the means at his command may be relied upon to effect the changes which seem most desirable. The treatment of a case in its *perfection,* like any form of art, can only be a matter of sheer genius. Figs. 2, 3, 4, and 5 illustrate two cases biting in "natural occlusion" and in their positions of "occlusal advantage." A thousand different cases will show a thousand different pictures. A study of *models* alone conveys *no idea* of what this position may be and "per se" may be very misleading as to what should be done.

Fig. 2.—Position of *natural* occlusion.

Fig. 3.—Position of *occlusal advantage.*

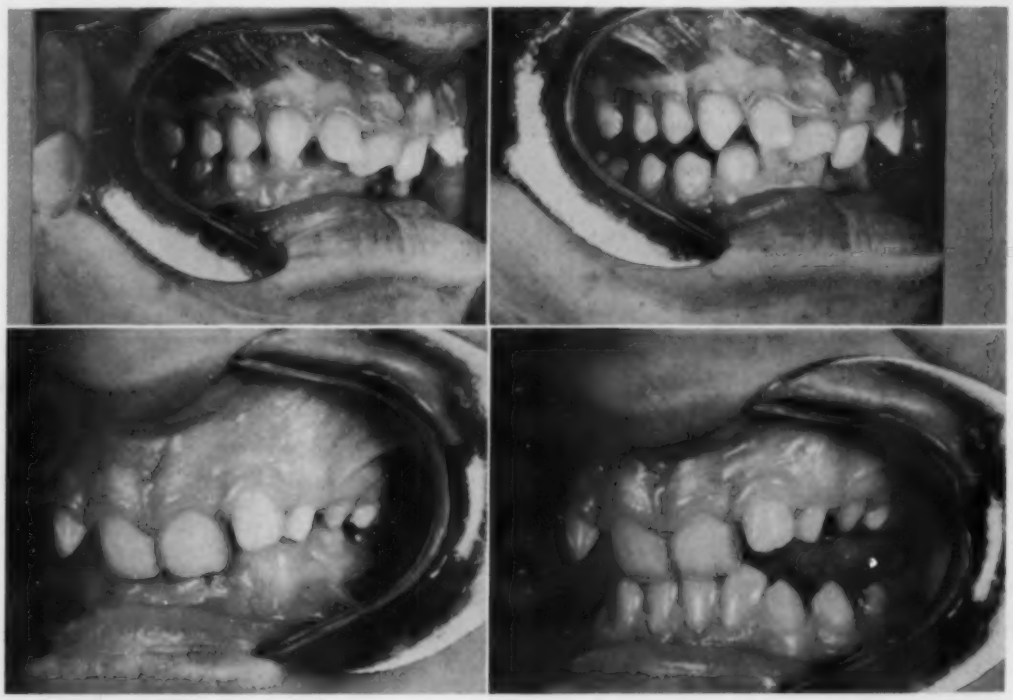

Fig. 4.—Position of *natural* occlusion.

Fig. 5.—Position of *occlusal advantage.*

A careful study of the position of "occlusal advantage" not only clarifies the problems of individual objectives, but also suggests the therapeutic means best suited to accomplish the desired changes.

As every case treatment proceeds, like every other vital activity, to its final objectives, in a series of correlated steps, it is very seldom, if ever, indicated that the same methods or appliances should be used for the entire treatment of a case any more than it is sensible to use the same club for an entire round of golf. The choice of appliances depends, therefore, on the orthodontist's basic philosophy of the subject. At the present time there seems to be a division of ideologies in orthodontics as definite and incompatible as those between communism and democracy.

Being by nature a democrat and an unqualified individualist, I personally look for appliances which permit of the utmost originality and latitude of adaptability, to the ever-present and inescapable factor of infinite variation. That comes before any other consideration.

At this point any one may well take time out to ask, "Does this mean that all the scientific problems involved in orthodontics, from anthropology down to the living patient himself, can be answered by one glance at an admittedly arbitrary position of the jaws called 'occlusal advantage?'" It naturally appears completely preposterous and the answer is, "Of course not." Yet, until someone suggests something better I think that from a purely *practical* standpoint it is the best we can do, and, to a great extent, is quite adequate. The reason for this is that science alone is completely helpless to furnish the concrete, practical answers we need to accomplish our purposes, and we must of necessity employ methods and faculties of an ultrascientific nature. There is nothing strange or unusual about this. We do it every day of our lives in many of our activities which are utterly incomprehensible in their innate complexities and yet whose exercise we think nothing of because they have *become commonplace through long practice of acquired skills.*

All the scientific knowledge in the world is as completely useless *by itself* to a practicing orthodontist as it is to a cowboy engaged in breaking an untamed broncho. They are both engaged in efforts to induce organic tissues to function in manners that were not intended in the original plans of nature.

TREATMENT

The simplest and most direct method of considering the actual problems encountered in everyday practice, and methods of dealing with them, is by the presentation of case reports. A careful selection of cases which involve extremes of variation makes quite clear the logical objectives of treatment and the *principles of universal application* which may be employed in attaining them. This eliminates a lot of tiresome abstract theorizing. In my own practice these *principles of procedure* are just four in number and belong in logical sequence to each other.

The *first* and most important principle, or act of procedure, is to *study the position* of *"occlusal advantage"* in its most comprehensive aspect and allow full rein to one's creative imagination, tempered, of course, by logic and common sense. This is the nearest approach to reducing to a *"single mental picture"* the entire panorama of any case with its individual problems and the means of treatment best suited to them.

The *second principle* consists in devising *for each successive step* in treatment the appliances best suited to the *problems of the moment,* coordinating the actions of the appliances used in the opposing jaws in order to avoid all possible trauma and allow the utmost freedom of movement of both the jaws and teeth while changes are taking place.

The *third principle* of treatment is that as action is followed by reaction, which is never quite predictable, a complete *re-evaluation of the entire case* should be made at *each visit* of the patient. The position of *occlusal advantage* should be constantly studied in minute detail. Depending entirely on the changes which have taken place between visits, should the decision be made whether to continue with the means which are being employed or to discard

them for something entirely different, either because the effect has not been what was expected or the desirable changes which have been obtained suggest something entirely different for the next move.

Treatment is based on strategy from start to finish. Not the strategy of this or that appliance, but an all-inclusive strategy which may include the use of all types of appliances as long as they are used at the time best suited to the problem of the moment.

The *fourth principle* is that as orthodontic treatment is performed on living functioning human tissue, subject at all times to the voluntary muscular efforts and intelligent mental cooperation of the individual for whom the work is being done, no work should be undertaken without having first prepared carefully the groundwork to insure these efforts to the utmost during the entire time that the case is under treatment. The qualities that an orthodonist should have are actually those of a good quarterback.

If these *principles* of procedure have any merit, it is just as important that the means employed in carrying the desired changes into effect should be in complete harmony with them. This involves the selection of appliances as well as the control of the muscular and mental efforts which must be exercised. It is entirely logical and practical to coordinate all of them. In my own practice, I employ four types of appliances which I also place, in accordance with my own methods of procedure, in their respective order of importance.

First, the plain labial arch with the infinite variety of labial auxiliary springs adaptable to its use. This appliance makes possible every conceivable individual tooth movement without disturbing basic anchorage, and also permits the simultaneous movement of anchor teeth with other individual tooth movements, without the movements of the one interfering with the other.

Second, bite planes in every form and description for the reason that through their use we make available the *natural force of occlusion* not only to produce tooth movements, but, what is still more important, to produce bodily movements of the mandible in its cranial relations and changes in the temporomandibular articulation. In the light of practical results and the rapidity with which some of these mandibular changes take place, it is my opinion, corroborated with that of a well-known radiologist, that some of the most important anatomical changes which occur as a result of treatment are mainly in the necks of the condyles. In some of these spectacular mandibular changes, the entire functional pull of the muscles is altered with untold benefits, not only to the function of mastication, but to facial contour as well.

Third, lingual arches with the infinite variety of auxiliary springs which may be used with them. They are the only logical types of appliances to be used for some tooth movements. In the forms of cribs or "guide" planes ("a rose by any other name would smell as sweet"), they have their very definite place. There is a very subtle line of demarcation between the choice of guide planes and removable plastic bite planes in treatment.

Fourth, the Joseph Johnson twin wire labial appliance, which is par excellence the best suited for cases where the compensatory effect of its gentle

pressure can be exerted simultaneously on a number of teeth, particularly multiple incisors. In skillful hands, and in accordance with Dr. Johnson's methods of procedure, it has a very great latitude of usefulness.

At this point I feel absolutely compelled in fairness to one of the outstanding figures in orthodontics to put in writing the greatest paradox I can think of. The most perfect orthodontic result that I have ever seen was a case treated personally by Dr. Charles Tweed using the edgewise appliance in accordance with his own principles. It was breath-taking in its perfection. Nevertheless, I do not use the edgewise appliance because it is not in harmony with my own philosophic concept of orthodontics. There are many ways, however, of arriving at the same end. I know of no two men in the profession who have been more open and honest in presenting their results than Dr. Tweed and Dr. Johnson, and nothing has been more unfair than the criticism that has been made of them in many instances by so-called authorities who have never in their lives shown any finished cases of their own.

Before proceeding to case treatments, I would like to go into a slightly detailed description of my favorite labial appliances and some improvements I have made in them in the last few years.

Fig. 6.

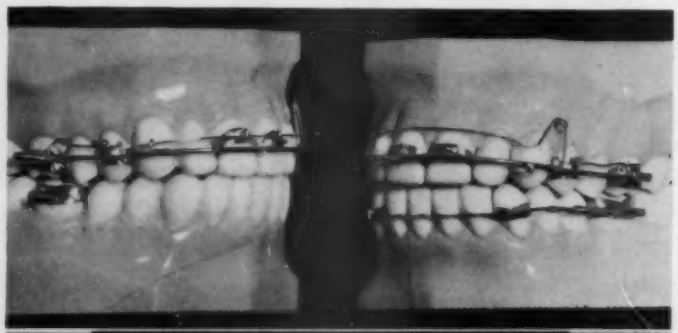

Fig. 7.

Figs. 6 to 16 show a variety of labial arches with auxiliary springs of various descriptions. The different combinations that can be devised to meet unique and unusual situations are only limited by the originality and ingenuity of those who employ them. In cases of distoclusion with deep overbites, the position of *occlusal advantage* may indicate that a downward and backward movement is desirable for the molars and premolars, while at the same time a gentle

Fig. 8.

Fig. 9.

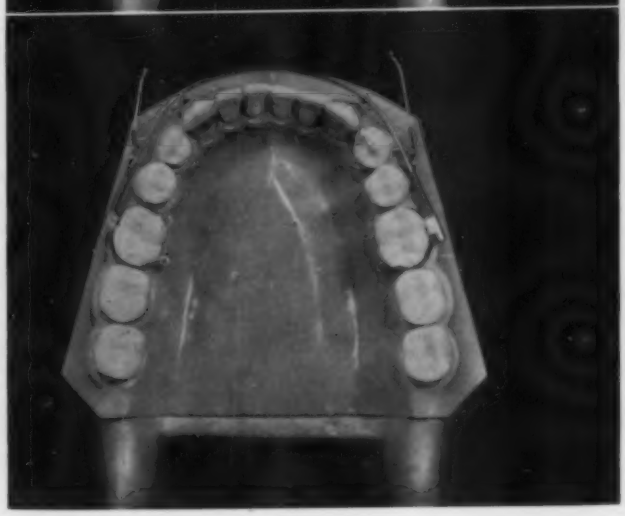

Fig. 10.

intrusive and retractive movement is indicated for the incisors. I know of no appliance which will perform this double action more perfectly. The appliance shown in Figs. 6 and 7 is a plain labial arch with short auxiliary springs to

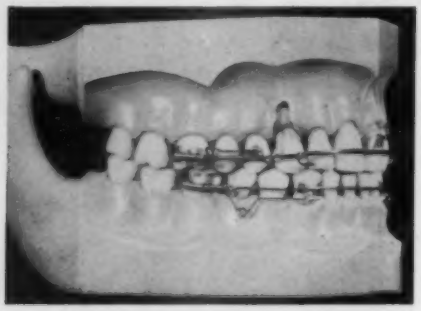

Fig. 11.

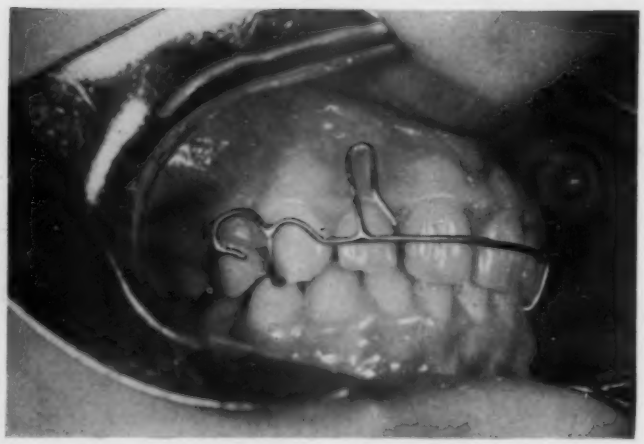

Fig. 12.

Fig. 13.

stabilize the arch with the first premolars and a long, very flexible labial auxiliary spring soldered to the arch on one side (usually the left from habit) as illustrated, with the other end lying freely in a loop soldered to the arch on the

opposite side. The uses to which this spring may be employed are practically unlimited. It may be bent to almost any shape desired and it is at times astounding to see the results at the end of a three-week or a month interval with the teeth in the exact alignment in which the auxiliary spring has been bent. This is particularly so in cases where it has been desirable both to intrude and retract the incisors. For the lack of a better name we have, in my office, dubbed this appliance the "double boiler" due to the fact that it is a "double" arch and is the one least liable to overdo or produce harmful effects in what is being attempted. Its most desirable feature lies in the fact that in making adjustments the relation which these bear to the ouline of the main arch can be seen clearly at all times.

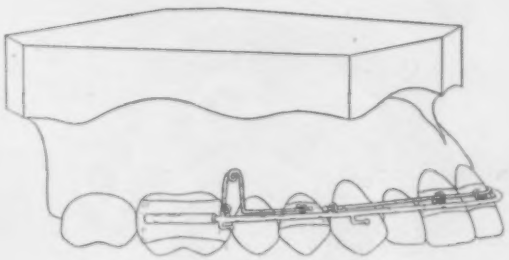

Fig. 14.

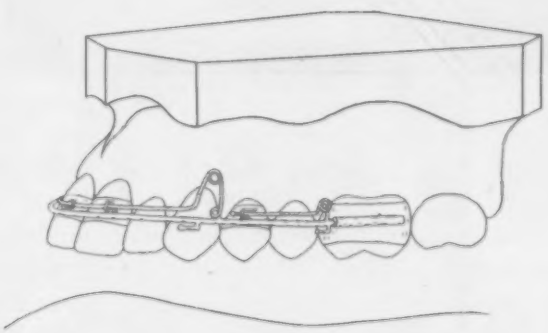

Fig. 15.

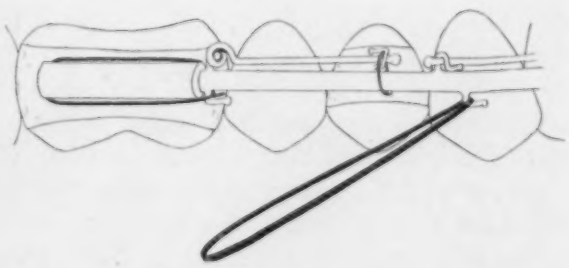

Fig. 16.

The *mandibular labial arch* with auxiliary springs placed within bracket hooks on the mandibular canines and ligated to the incisors affords an anchorage for intermaxillary traction incomparably superior to the plain lingual arch.

As the coronal positions of the mandibular teeth are controlled by the shape of the labial arch, judicious pressure from auxiliary springs, applied gingivally to the labial arch, may produce torque, rotations, or depressions of these teeth in a gentle continuous manner without the danger of the ill effects which occur where harsher methods are employed. Sometimes the mere supraclusion of one or both mandibular canines is the sole interference that prevents a perfect occlusion. Depressing them gently permits also just enough labial expansion for the proper alignment of the other incisors. (Figs. 8, 9, 10, and 11.) Figs. 17, 18, 19, 20, and 21 show some bite planes and lingual arches.

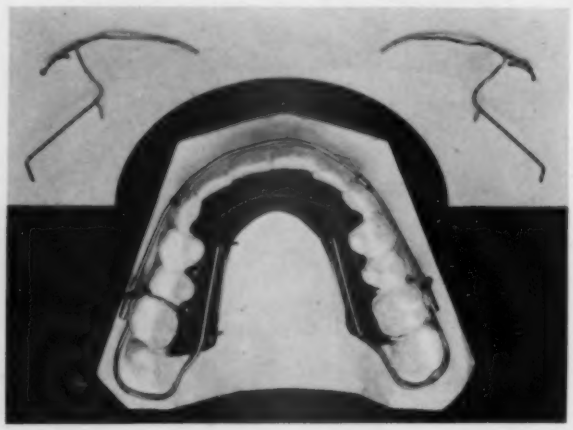

Fig. 17.

Fig. 22 illustrates two extremes of "natural" variation in structural balance.

The two individuals from whom these casts were made are two "typical" American youths of high school age. Physically they could easily be taken for brother and sister. Does it seem logical that the enormous discrepancies in the proportions of the teeth and the growth and development of the jaws can be attributed to differences in environment? They are both obviously well fed. If *stimulation* is what is needed in the one case to increase the proportion of bone, what about the other case in which there is too much bone for the size of the teeth? Should natural growth be artificially *inhibited* to maintain a satisfactory structural balance?

This brings up the delicate and controversial subject of "extraction" which has recently been debated at length pro and con. The results of the treatment of these two cases are shown in Figs. 22, 23, 24, 25, and 26. Can anyone with an atom of common sense or artistic feeling imagine that the first case could have been improved without some judicious extraction? As can be noted, four premolars were removed to obtain the result which is shown. The amount of tooth movement possible is determined to a great extent by the positions of the apical bases of the teeth and the amount of basal bone present. A comparison of these two cases is in itself a study of one of the basic problems in orthodontics. Between these two extremes there lies a stretch of hallowed ground where only

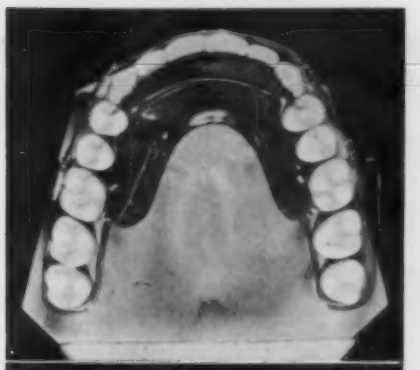

Fig. 18.

Fig. 19.

Fig. 20.

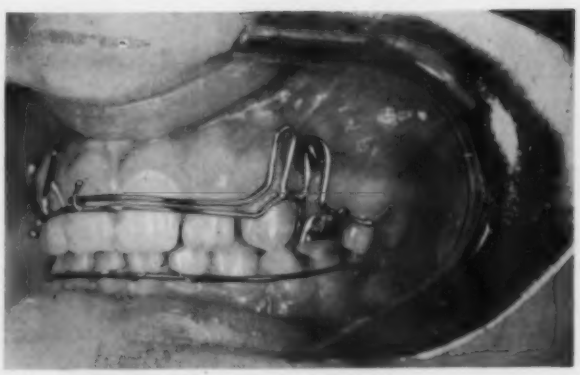

Fig. 21.

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 25.

angels dare to tread! Nature very kindly leaves us a reasonable "margin for error"! It is inane to think that extractions are not justifiable on purely scientific evidence, but they should be considered with perhaps greater conservatism than is being practiced by some groups at present. This next case is presented as *typical* for the *methods of procedure* which have been explained in the preceding pages.

Fig. 26.

Fig. 27 shows the model of the right side of a case of distoclusion and crossbite, combined with a fair degree of structural balance between the sizes of the teeth and the bony development, but great facial disharmony owing to an extremely small mandible displaced distally.

Fig. 28 is a view of the same model from the left side. Note the position of the left lateral maxillary incisor. Figs. 29 and 30 are views of the model placed in the position which they assume when the patient bites in the position of "occlusal advantage."

Fig. 31 shows the *patient* biting in the position of *occlusal advantage*. In this position, the only teeth that occluded were the lower incisors and the left lateral maxillary incisor.

The first step in treatment consisted in placing a plain labial expansion arch on the first maxillary molars. To this was soldered a labial auxiliary spring, to move the maxillary left lateral slightly labially, and a short buccolingual elastic from a hook on the lingual surface of the *upper* right first molar to a hook on the buccal surface of the *lower* right first molar. The labial arch was expanded buccolingually and a short intermaxillary elastic stretched between the hook on the lingual surface of the maxillary right molar to the buccal hook on the right mandibular molar. In the course of a few weeks, the buccolingual relation of the upper and lower right first molars had been corrected and the patient was able to place the mandible in a much more satisfactory mesial position in relation to the maxilla owing to the removal of the *interference* of the left lateral incisor. At this point, a Johnson twin wire appliance was inserted temporarily to align the maxillary incisors, continuing the buccolingual elastics

Fig. 27.

Fig. 28.

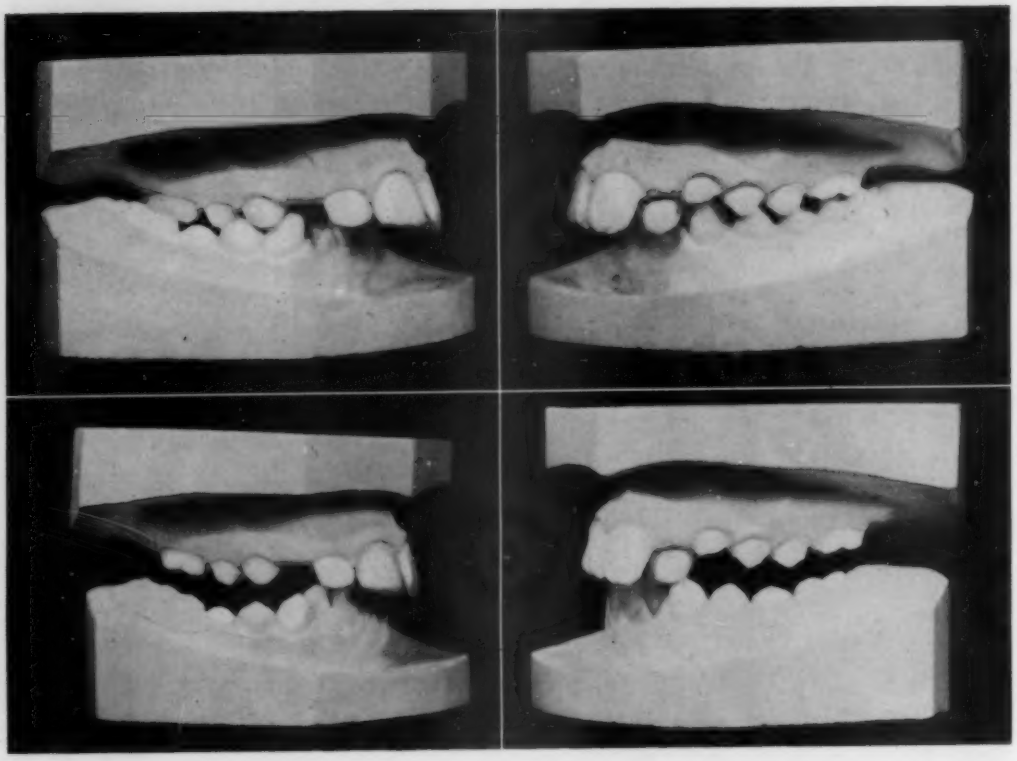

Fig. 29.

Fig. 30.

Fig. 31.

Fig. 32. Fig. 33.

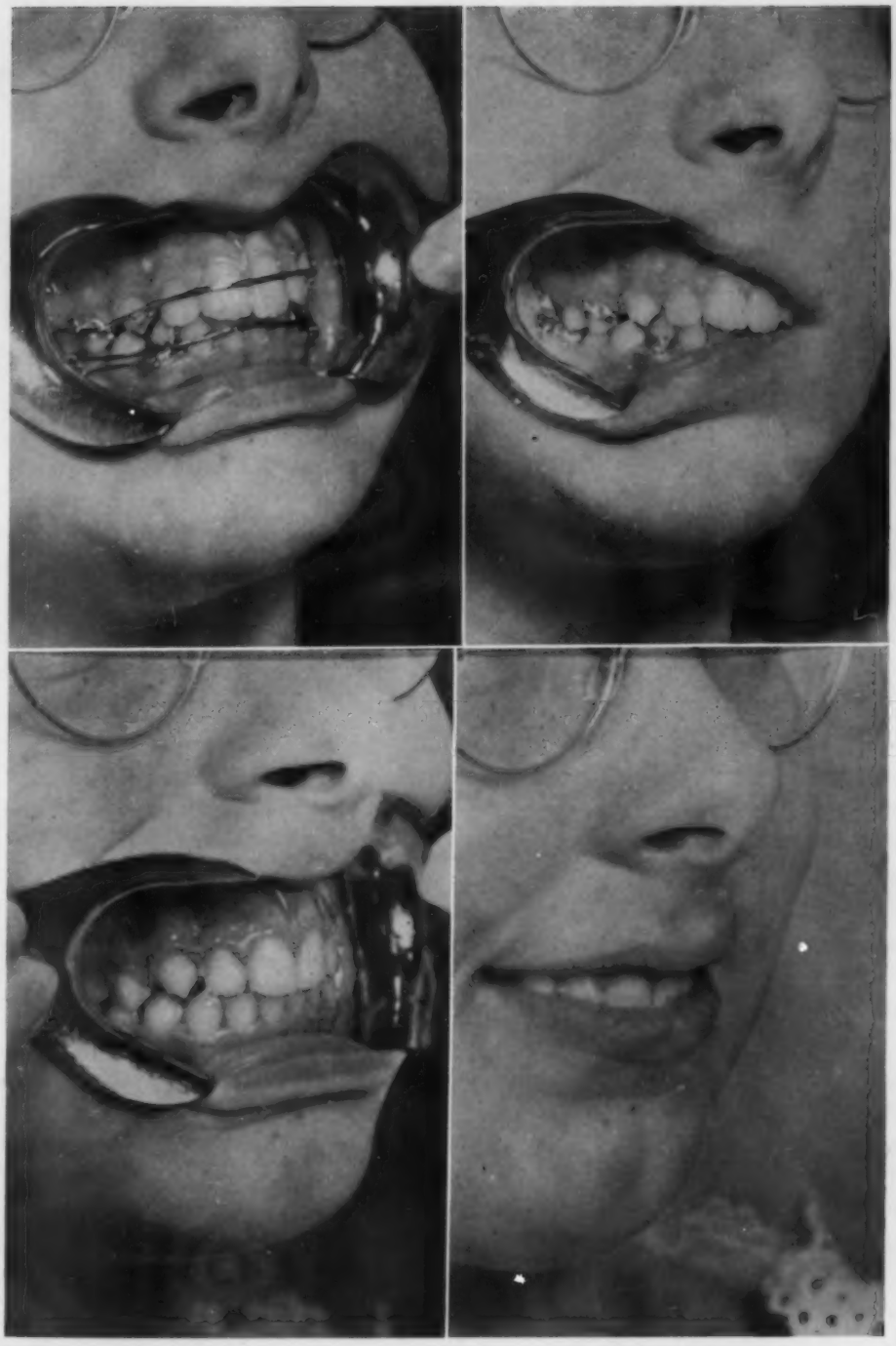

Fig. 34. Fig. 35.

on the molars. When this was accomplished, the twin wire was removed and a lingual crib was inserted, together with a plain labial arch with intermaxillary hooks. The labial arch was wired to hooks placed on bands on the first premolars, as illustrated. A labial arch with auxiliary springs on the canines and ligatures on the incisors was constructed for the mandibular teeth, and intermaxillary traction was started. The less that intermaxillary traction is used and the more the patient can aid in repositioning the mandible by voluntary muscular effort, the more natural and better the treatment. The appliances employed were designed for that purpose and to change the *vertical* relations of the teeth so that the forward position of the mandible would be in the shortest space of time the most comfortable and natural one to maintain.

Treatment of this case was started in June, 1946, and Fig. 32 shows the position of the jaws in January, 1947. Fig. 32 shows the appliances just described in place, and Fig. 33 shows the occlusion with the appliances removed. Figs. 34 and 35 show the condition of the case six months later, or just one year after the case was started.

Fig. 36 shows a case of quite extreme maxillary constriction together with a more than well-developed mandible. It is impossible to disassociate the sizes and relations of the two. Nature can be quite inconsiderate at times. The inclination to effect a better structural balance in the maxilla by some judicious extraction seemed desirable at first glance, but it might have incurred worse complication, so a conservative course of treatment was followed with the results shown in Figs. 37 and 38.

Figs. 39, 40, and 41 show a case of a very constricted maxilla with a well-developed and well-proportioned mandible in its relation to facial balance. The bite was in distoclusion. The removal of two maxillary first premolars and the alignment of the teeth with a Johnson twin wire produced the results shown in Figs. 40 and 41. It is tragic to think that many of us started our orthodontic efforts with the goal of a full complement of teeth in every case and that the *basis of diagnosis and treatment* was the relations of the first molars, regardless of other factors, many of which are far more important than these. Time marches on!

There are some cases in which the use of the Johnson twin wire appliance is so ideally suited to requirements that to report the results of treatment is merely to pay tribute to the contributions which Dr. Johnson has made to orthodontics. Figs. 42 and 43 show a condition in which the reciprocal force of the twin wire arch on several teeth makes treatment simple and effective. Fig. 44 shows the appliance which did the trick, and Figs. 45 and 46 show the case after treatment.

Fig. 47 shows the final result of active treatment in a patient who had undergone several years of orthodontic treatment before being referred to me. The patient himself was a veritable giant in size, about six feet, eight inches, with a somewhat acromegalic appearance. The condition as I took it over was in mesioclusion and open-bite—a delightful combination! During the previous

Fig. 36.

Fig. 37.

Fig. 38.

Fig. 39.

Fig. 40.

Fig. 41.

treatment, two maxillary premolars had been removed. To compensate for this, I had the two first mandibular premolars extracted and after a hard struggle obtained the occlusion shown, which is fairly satisfactory from the standpoint of function and appearance. From there on the question of retention became

Fig. 42.

Fig. 43.

Fig. 44.

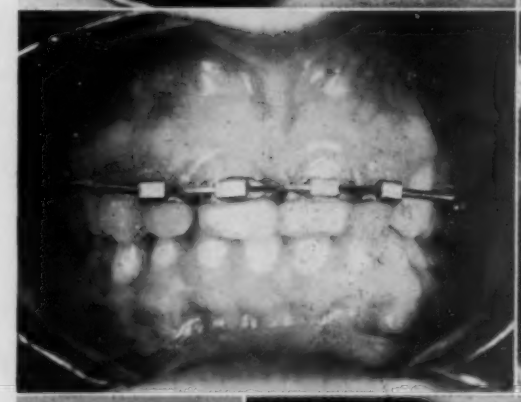

Fig. 45.

Fig. 46.

the problem. In order not to keep appliances on for the rest of the patient's life, I devised the retainer which is shown in Fig. 47. This consists of an ordinary Hawley retainer to which is soldered a labial extension which presses

against the lower incisors when the mouth is closed. In addition to exerting pressure against these teeth, it acts mainly as a reminder to the patient to keep his mouth closed and the mandible as far back as possible. The patient was exceedingly cooperative and it seemed to be the solution to a difficult problem of retention.

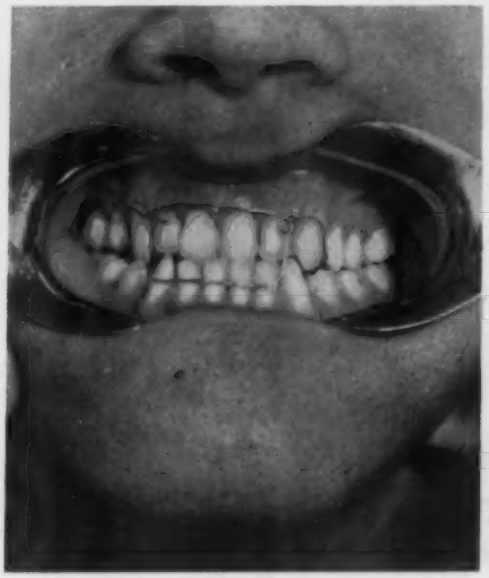

Fig. 47.

Orthodontics is claimed by some to be mainly a growth problem, though why nature should take such peculiar forms at times is difficult to understand. The unusual size of the mandible seems, in some cases, to be due to some endocrine disturbance. Whether this be the cause or not, there are cases beyond the limit of orthodontic therapy alone. Such a case is shown in Figs. 48 and 49. The only teeth in contact were the second molars. Outside of the occlusion of the teeth the individual seemed quite normal physically. A combination of some oral surgery (by Dr. James R. Cameron) and some orthodontics produced the result shown in Figs. 50 and 51. The oral surgery consisted of a double resection of the ramus of the mandible. Preparatory to this, the orthodontic work consisted in banding every available tooth in both jaws and adjusting labial arches of 0.038 inch wire on brackets on each tooth. To these arches were soldered spurs at carefully selected intervals, so that immediately after the operation short intermaxillary elastics were stretched between the spurs on the arches of the opposing jaws to keep them in the most desirable position until the consolidation of the bone had taken place. (Figs. 52, 53, 54, and 55.) To finish cases of this kind satisfactorily, some further orthodontic treatment is usually necessary.

Figs. 56, 57, 58, and 59 are those of another case of distoclusion with labioversion of the maxillary incisors. Figs. 56 and 57 show the patient biting in "natural" occlusion and Figs. 58 and 59, in the position of "occlusal advantage." The right maxillary incisor had suffered an accident, chipping the

Fig. 48.

Fig. 49.

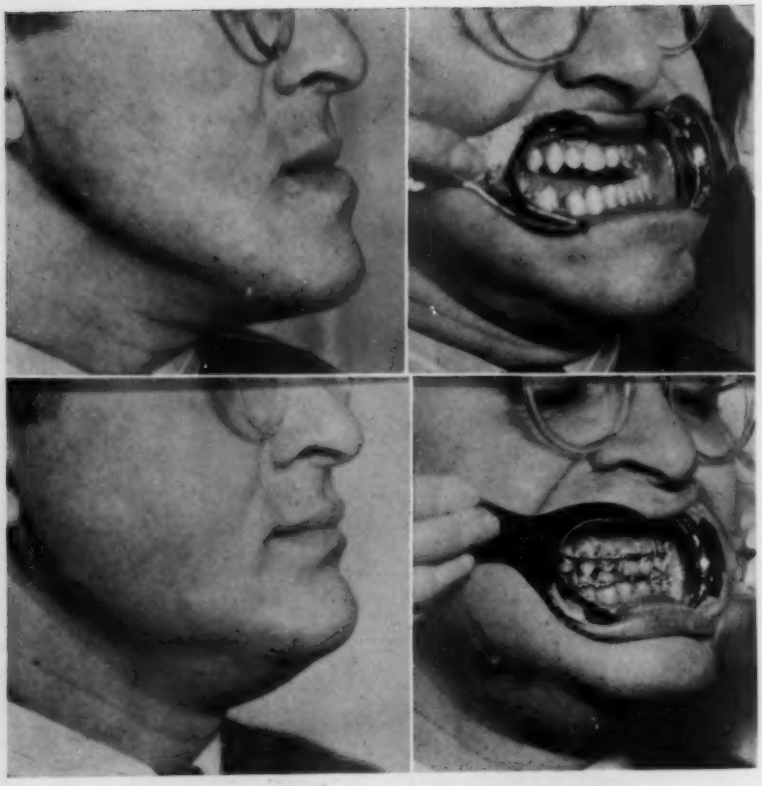

Fig. 50.

Fig. 51.

Fig. 52.

Fig. 53.

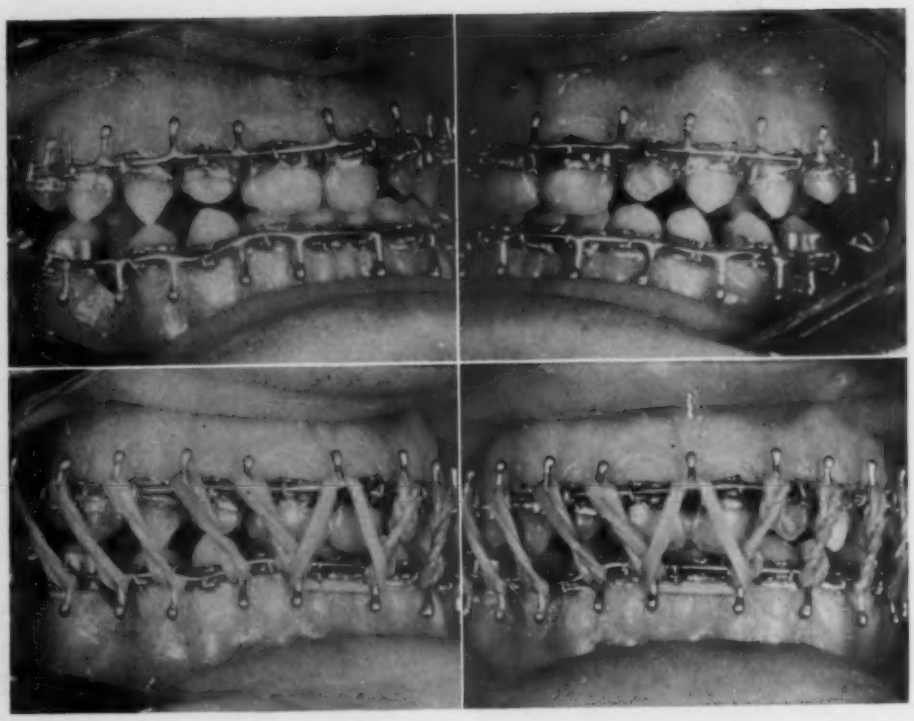

Fig. 54.

Fig. 55.

distoincisal corner and fracturing the root at about the apical third. There were no clinical symptoms when treatment was started and the case was treated with the "double boiler" labial appliance. Notwithstanding the fact that the fractured tooth was moved a considerable distance as shown in Fig. 60, there was no soreness or trouble of any kind during treatment. Fig. 60 shows the change in the vertical plane of the occlusion as a result of using that type of appliance.

Fig. 56. Fig. 57.

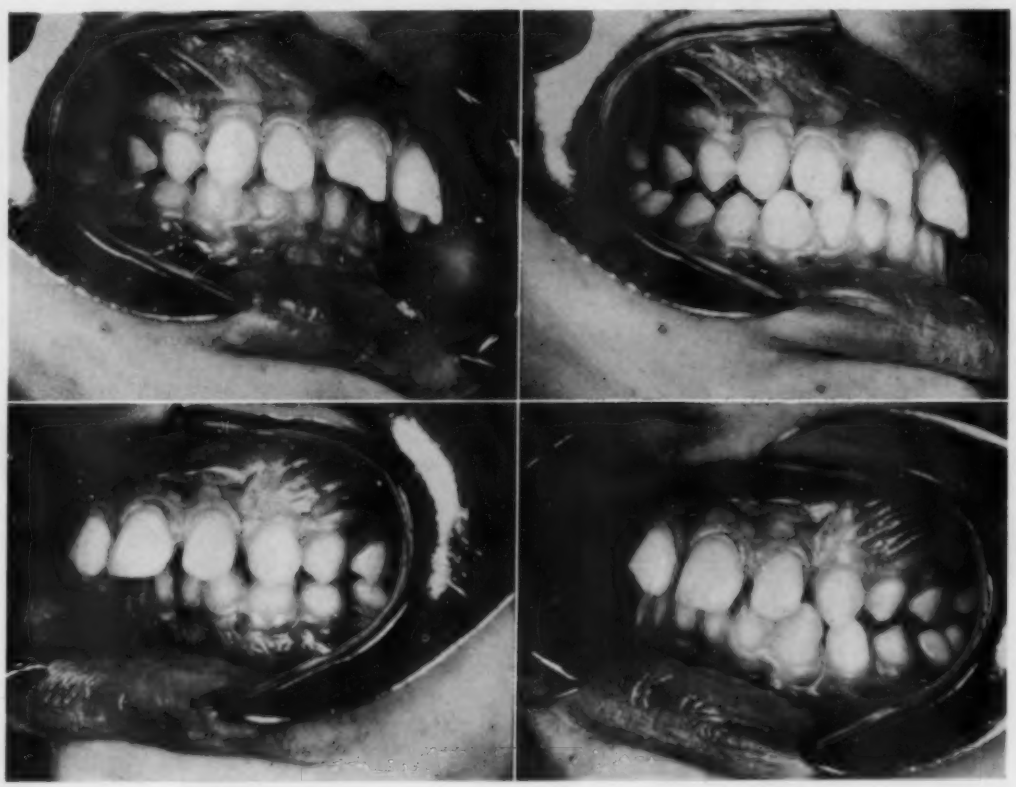

Fig. 58. Fig. 59.

Figs. 61, 62, 63, 64, and 65 show the case of a young boy with an extreme case of distoclusion and cross-bite with maxillary teeth on the left side completely out of occlusion with the lowers. Figs. 61, 63, and 64 show the positions of the mandible and teeth in "natural occlusion," and Figs. 62 and 65 in the position of "occlusal advantage."

Figs. 66, 67, and 68 show the result of treatment over a period of several years. The condition of the occlusion, as shown in Fig. 64, made it imperative to start early treatment. This consisted of combinations of labial arches with a series of bite planes. The most natural occlusion at the present time is that shown in Fig. 66 which makes it seem quite clear that the main change has been a repositioning of the mandible. It is still possible, with some effort, to bite somewhat distally, but the inclination to do this is becoming less as time goes

Fig. 60.

Fig. 61.

Fig. 62.

Fig. 63.

Fig. 64.

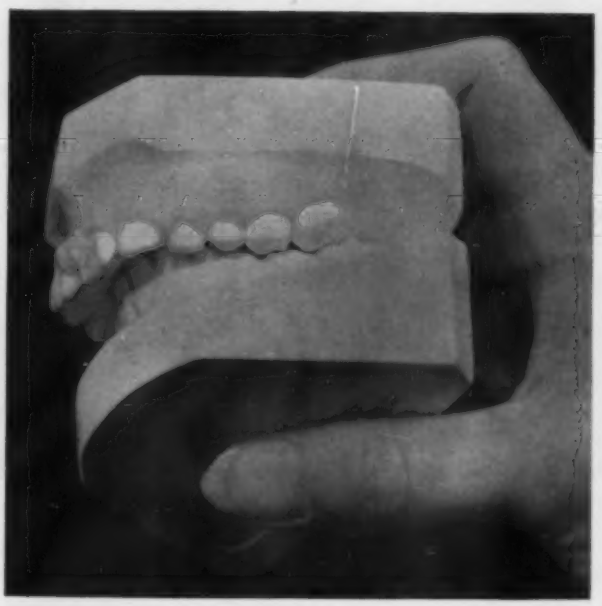

Fig. 65.

by, due to the fact that the vertical arrangement of the occlusion makes the position which is shown the most comfortable. It is impossible to get good results in cases of this kind without the intelligent cooperation of the patient. The patient in this case was in the "near genius" category.

Fig. 66.

Fig. 67.

Fig. 68.

Any experienced orthodontist who endeavors to write with complete sincerity knows perfectly well that it is impossible to explain in words some of the subtle reactions to treatment which occur in actual practice. The insidious

tendency to open-bite shows its ugly head the instant the equilibrium of some cases is barely disturbed, and many other incomprehensible reactions, which are quite inexplainable on the basis of rational analysis alone, occur.

Much of the confusion which exists in orthodontics stems from the fact that the sincere workers in the field themselves are actually divided into two constitutionally distinct types whose outlooks on life are completely different. Some excerpts from an artible by Prof. William Morton Wheeler are very illuminating in this respect. Dr. Wheeler said:

> On reviewing my students and the mature investigators I have known during the past half-century, I find that most of them belong to two extreme types, while the remainder are intermediate or ambiguous composites. These extremes correspond with the *romanticist* and *classicist* types, respectively. The more numerous *romanticists* or extroverts are the *naturalists;* the classicists or introverts are the biologists in the strict sense.
>
> The naturalist is mentally oriented toward and controlled by objective, concrete reality, and probably because his senses, especially those of sight and touch, are highly developed, is powerfully affected by the esthetic appeal of natural objects. He is little interested in, and may even be quite blind to abstract or theoretical considerations.
>
> He is primarily an observer, deeply impressed by the overwhelming intricacy of natural phenomena and revelling in their very complexity. He is, therefore, more or less irrational, intuitive, receptive, and passive in his attitude toward natural objects, *synthesizing* rather than *analyzing.*
>
> The biologist "sensu stricto," on the other hand, is oriented toward and dominated by ideas, and rather terrified or oppressed by the intricate hurly-burly of concrete, sensuous reality and its multiform and multicolored individual manifestations. His *will to power* takes the form of experimentation and the controlling of phenomena by capturing them in a net of abstract formulas and laws. He is a denizen of the laboratory. *His besetting sin is oversimplification* and the tendency of *undue isolation* of the organisms he studies from their *natural environment.*
>
> The naturalist seems to represent the more youthful, the biologist the more mature, type. For this reason a naturalist may develop into something of a biologist, but a biologist never becomes a naturalist. Occasional individuals may combine the characteristics of both types. The naturalist never feels really at home in a university environment, probably because university faculties include such a large number of introverts.
>
> The naturalist and the nature-lover will always be with us. No matter how far the naturalist may specialize in his study of single groups of organisms he is always *keenly aware* both of the *limitations of his specialty* and of its relations to the *whole realm of living things.* Such modesty is not always apparent in the biologist in the strict sense, because he is not engaged in sympathetically exploring the contours of nature, but in determining the extent to which phenomena conform with his experimental, metrical, and therefore highly rational procedure.

It would be most fortunate for orthodontics if those engaged in its advancement were *limited* to these two types.

The great majority of orthodontic cases are definitely nonpathologic in nature, and the prevention of malocclusions might be mainly achieved by selective breeding of the human race. It would be difficult, however, to enforce this at the present time, and it might take a few hundreds of years to obtain any large-scale results.

THE NO MAN'S LAND OF DENTISTRY

A Challenge

Roy G. Ellis, D.D.S., M.Sc.(dent),* Toronto, Canada

PERHAPS it would be unfair to say that there is but one "no man's land of dentistry." Indeed there may be many, but there is one in my opinion which stands out above all others in importance to the dental profession today.

In May, 1945, Dr. Oren A. Oliver read a paper entitled "The Dentist's Responsibility to Child Patients," which was subsequently published in the *Journal of the Ontario Dental Association*, August, 1945. In that paper, Dr. Oliver issued a challenging statement which has concerned me greatly since I heard it. Dr. Oliver said, "It is my opinion that at least 50 per cent of all malocclusions and facial deformities arise from simple, minor or environmental causes." If this is true, or nearly true, we do not have to wait until the dawn of the caries-free era to make an important preventive service available to mankind; it is our responsibility to accept this challenge and make the most of our present opportunities.

When we consider the significance of Dr. Oliver's statement, the title chosen for this address focuses our shortcomings on a vital problem. I should like to ask the following questions concerning the existence of a "no man's land":

a. Where is this "no man's land"?
b. How serious are the implications of the existence of this "no man's land"?
c. Whose responsibility is it for attacking this "no man's land"?
d. Is the attacker adequately prepared for the task?

In attempting to answer these questions, my purpose is merely to define the area involved and to place the responsibility for future action. The first question may be answered by stating that the "no man's land" under consideration lies astride the fields of the operative dentist (a general practitioner) and the orthodontist. I realize that a no man's land is a dangerous area to step into, and I am fully cognizant of the old saying that "fools rush in where angels fear to tread," but, nevertheless, I have defined the area and I shall state my convictions with respect to it.

The dental care of the child is the responsibility of the general practitioner, and it is to him that the child presents. Early changes from the normal should be observed and understood by the general practitioner. But the general practitioner does not often recognize changes in their incipiency, and even if he does

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he is liable to accept the stand that factors which relate even remotely to malocclusion, whether of etiology or treatment, are the responsibility of the orthodontist. On the other hand, the orthodontist sees comparatively few of these incipient cases of malocclusion. Furthermore, many causative factors which perhaps are simple at the outset have been considered very trivial, and by the time interception is undertaken, complications have arisen. These and many other considerations contribute to the existence of this "no man's land," which results in failure to recognize many incipient cases of malocclusion at a time when simple preventive measures might be very effective.

The responsibility, therefore, for the attack on this "no man's land" lies with the general practitioner, in his capacity as guardian of the child's dentition. His responsibility on behalf of the child does not cease with the filling of cavities in teeth.

The fourth question asked above concerns the adequacy of preparation of the general practitioner for the broad task in hand. The task is one of maintaining a continuity of normal arch development through the early recognition of changes from normal and prevention of the effects possibly arising from abnormal conditions, by intercepting those early changes. This does not involve orthodontic treatment. Malocclusion does not exist as yet. The education of the student of today must be such that the graduate of tomorrow, as a general practitioner, will be capable of fulfilling his obligations to his young patients in a complete preventive program. Herein lies the necessity for a cooperative effort by teachers in orthodontics and pedodontia in the training of the general practitioner.

THE GENERAL PRACTITIONER

The general practitioner is a much-abused and harried professional man. He is expected to be a good general diagnostician, conservative operative dentist, prosthodontist, periodontist, endodontist, pedodontist, exodontist, preventive dentist, to have some knowledge of orthodontics, and be an economist of sorts, at least that he may make adequate returns to the income tax authorities. All this the general practitioner is expected to accomplish in spite of the fact that his education has been a bit lopsided in favor of restorative technique. Indeed, he is truly one who knows "less and less about more and more."

To the previous formidable list of accomplishments, we now add the necessity for the general practitioner to be very observant, and conquer a "no man's land." Let us call it the field of "*prophylactodontia.*" Prophylactodontia according to my dictionary is the art and science of "advance guarding of the mouth and teeth by preventing disease, malpositions and deleterious influences" (Ottofy).

I am not in favor of the terms which have been commonly used, namely, "interceptive orthodontics" and "preventive orthodontics," because they immediately, psychologically at least, suggest the field of orthodontics, and relieve the general practitioner of his responsibility.

Prophylactodontia covers a very broad field including any or all prophylactic measures necessary to the safeguarding of oral tissues against disease and other disturbing influences. Therefore, it includes:

a. Dental caries
b. Diseases of soft tissues
c. Incipient changes which may lead to malocclusion, e.g., habits, etc.

Broadly speaking it involves *observation* of conditions and influences affecting the oral structures and *interpretation* of the effect of these conditions in terms of future developments.

Observation of conditions present will best be made by a careful examination of the oral cavity and its environment. The examination of the mouth of the child by the general practitioner is not always adequate. It should be systematic and all-inclusive.

In logical order, the following phases should be completed:

1. Physical status and general appearance of the child
2. Vestibule of the mouth
3. Oral cavity proper
4. Miscellaneous factors

Some of the points or conditions which are most important if the general practitioner is to intercept incipient changes from the normal include recognition of: premature loss of deciduous teeth, over-retained teeth, congenitally missing teeth, supernumerary teeth, impacted teeth, habits, uneven absorption of roots of teeth, effect of poor operative restorations, nutritional disturbances, metabolic disturbances, tonsil and adenoid enlargements, occlusion of posterior teeth and cusp relationship, overbite, retained deciduous roots, the eruption pattern and its influences, and many others.

The *interpretation* assigned to any abnormalities found will be dependent upon the education and experience of the dentist.

EDUCATION

The objective of dental education of the general practitioner in the field of prophylactodontia is that he may fulfill completely his obligation to his child patients. Does dental education as presently accepted completely satisfy the requirements in this field?

It is logical that the dental student should be educated, firstly, to know and understand fundamentals of growth and development of normal structures in the dental field. This includes embryology, anatomy, and histology, both general and dental, not as individual subjects, but as integrated phases of the study of the living organism as a whole.

The second phase in dental education should be directed toward the maintenance of normal structures in physiologic health. This includes biochemistry, physiology, and preventive dentistry, again not as individual subjects, but as they relate to one and the same living organism, with all its individual units.

When a knowledge of growth and development is mastered by the student and the processes of function are understood, it is more likely that early changes from the normal will be recognized, either as the change affects one minute part or the whole, and preventive measures will be possible.

The field of prophylactodontia is dependent upon this broad foundation outlined above and not upon the individual efforts of prevention of the various groups working separately. The responsibility for the field of prophylactodontia rests with the general practitioner, who is the guardian of the child's dentition. He is dependent upon his own powers of observation and upon the combined efforts of all groups for his education which he must apply in the interpretation of his findings.

CONCLUSION

When this rather idealistic objective is attained for the general practitioner, a significant new era will have dawned for the dental profession, an era of true prevention, an era that will establish the position of the dental profession as a true health service.

ENDOCRINES: THEIR RELATION TO ORTHODONTIC DIAGNOSIS AND TREATMENT PLANNING

SYDNEY CROSS, D.D.S., M.D.Sc.,* LOS ANGELES, CALIF.

THE subject of endocrinology itself is such a complex one that it is most difficult of comprehension even without an attempt at correlating it with orthodontics. Moreover, due to exhaustive research being conducted in this field, the concepts of modern endocrine medicine are constantly changing. It is a far cry from the early work of Brown-Séquard, a French biologist, who in 1839 attempted the first known experiments in hormones, to the scientific research and contributions of Engelbach, Shelton, Hoskins, Cushing, Shelling, Rolleston, Cameron, and many others. We owe a debt of gratitude to the medical profession for its intensive research in the field of endocrinology. Moreover, endocrine medicine has made rapid strides in the last two decades, largely due to the combined efforts of the physiologist, the chemist, and the endocrinologist.

We as orthodontists are naturally concerned with the correlation which exists between endocrine dysfunction and malocclusions. It would be presumptuous on our part to attempt a diagnosis of the patient's physical condition, nor are we called upon to do so. However, in maintaining a diagnostic routine we should not overlook those manifestations which would lead us to suspect the existence of some endocrinopathy. It is not only our duty but our responsibility to require under those circumstances a complete physical check-up in order to confirm or deny these suspicions. It is imperative, and I cannot emphasize this fact too strongly, that the patient be directed to an endocrinologist and not the general practitioner, for in the latter instance the subsequent diagnosis and medication are valueless, if not in fact harmful. My own personal experience, and this has been corroborated by my associates, has taught me that the average physician is woefully ignorant of endocrine medicine. For example, a patient who presents at the office of his medical doctor with marked overweight is not infrequently administered massive doses of thyroid solely on the basis of this manifestation. This patient could readily be hypopituitary rather than hypothyroid. It is amazing to observe how frequently thyroid and pituitary hormones are administered with no adequate laboratory findings to substantiate the treatment. This shotgun administration of hormones is plain unadulterated quackery and, to say the least, is indicative of slovenly diagnostic work. Our patients should not be subjected to such treatment.

As you are all well aware, there are many pitfalls in orthodontics, despite the most painstaking diagnosis and treatment planning. We cannot, therefore, afford to ignore the existence of such possible systemic disturbances. To attempt by purely mechanical means the movement of teeth, when the patient's growth and development are obviously abnormal, is to invite failure from inception.

Read before the Pacific Coast Society of Orthodontists, San Francisco, Calif., Feb. 24, 1947.

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The endocrines, or ductless glands, are so-called because they pour their secretions directly into the blood stream, and are as follows: the pituitary, the thyroid, the parathyroids, the pineal, the pancreas, the adrenals, and the gonads, the latter being the testes in the male and the ovaries in the female. I intend to discuss briefly the physiology and pathology of these glands, with particular attention to the pituitary, thyroid, parathyroids, and the gonads, for they are the ones which are known to be the most likely predisposing causes of malocclusion.

Fig. 1.—Note enlarged sella turcica due to a pituitary tumor.

THE PITUITARY GLAND

The hypophysis or pituitary gland is composed of two lobes, namely the anterior and the posterior. In the adult, it is located in the center of the head lying in a saddle-shaped recess of the sphenoid bone, the sella turcica, which, literally translated, means Turkish saddle, so-called because of its shape. The

size and shape of the sella turcica is often affected by tumors, as is shown in Fig. 1, and which proves to be a valuable roentgenographic diagnostic aid when supplemented, of course, by a clinical examination and other data pertinent to the patient's condition. The chief functions of the anterior lobe are two, namely, growth and sexual maturity, controlled through the growth and gonadotrophic hormones, respectively, which it secretes. There is a known interrelationship between the pituitary and some of the other ductless glands. For example, the pituitary secretes the following: a thyrotrophic, diabetogenetic, fat metabolism, and galactogenic hormone. This fact makes diagnosis of endocrine dysfunction difficult and confusing, another argument in favor of directing the patient to a well-trained endocrinologist. The posterior lobe of the gland has no known bearing on orthodontics, its chief function being that of control of water metabolism of the body.

PATHOLOGY OF THE PITUITARY GLAND

Hyperpituitarism, which is, of course, an oversecretion of the gland, exhibits two chief manifestations dependent upon the age of the patient at the time of onset of the glandular disturbance. In younger patients, before the closure of the epiphysis, gigantism occurs with resultant rapid growth of the skeleton and excessive muscular strength and sex powers. This is the picture of the typical circus giant. Acromegaly, on the other hand, occurs only after the closure of the epiphysis, when growth in stature is not possible. The chief manifestation of this is an enlargement of the extremities such as the hands, the feet, the nose, and the mandible. For some unknown reason, the maxilla is not appreciably affected. If hyperpituitarism begins before the closure of the epiphysis and continues on after its closure, there is a possible combination of gigantism and acromegaly in the same patient. The professional wrestler known commonly as "The Angel" exhibits all the grotesque features of the acromegalic patient. The overdevelopment of the mandible is accompanied by a gradual spacing of the mandibular teeth and a marked prognathism.

Cushing's disease, so-called because of its discovery by the late Dr. Harvey Cushing, is caused by an overgrowth of the basophilic cells of the anterior lobe of the pituitary gland. The bones lose calcium salts, the blood sugar rises above normal, the skin acquires a dusky, congested appearance, and the patient frequently becomes stooped and round-shouldered.

In hypopituitarism, a deficiency in the hormones secreted by the gland causes a marked decelleration of the growth of both the hard and soft tissues. The pituitary dwarf is small but symmetrically proportional—in fact, he is the man in miniature (Fig. 2). In contradistinction to the giant, who is mentally retarded, the dwarf is a keen-minded individual. The disturbance in growth and development is also reflected in the dentitions. There is a tardiness in tooth calcification and also in eruption, accompanied by a lack of mandibular and maxillary development, with every possibility that the teeth will become crowded or submerged. The hypopituitary patient frequently shows a denture which is characteristic of and in keeping with his developmental and skeletal

age. In extreme cases, the patient whose chronological age is 18 may have the denture of a child of 8 to 10 years. There are naturally varying degrees of over- and underfunction of this gland, and, therefore, the disturbance to growth and to the dentitions is in proportion to the severity of the disease.

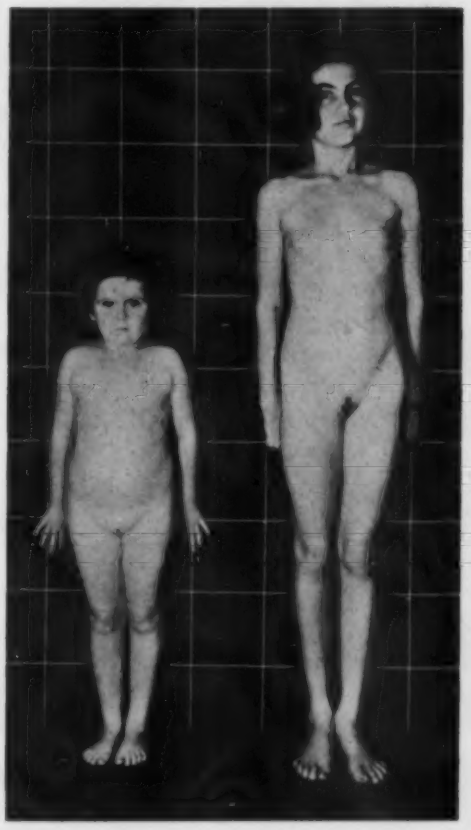


Fig. 2.—A true pituitary dwarf 11 years of age and a girl of normal stature the same age. (Courtesy of Shelton, E. K.: Am. J. Dis. Child. 47: 719-736, 1934.)

Fröhlich's disease or Fröhlich's syndrome, as it is commonly known, is another clinical disorder in which the pituitary deficiency plays a part. This condition is not uncommon and may take place any time from early childhood to maturity. The patient is obese and shows a depression of the sex functions. The genitalia remain underdeveloped in the young and atrophy in older patients. The hands and feet remain small and delicate in contrast to the rest of the body. There is a characteristic apron of fat at the level of the hips and also a development of fat in the mammary gland region, giving the male a pseudofeminine appearance.

THE THYROID GLAND

The thyroid gland straddles the trachea at the base of the neck. It is composed of a left and a right lobe with a connecting portion known as the isthmus. Its importance to the physiology of the body is indicated by its rich vascular

supply. It aids in setting the pace of the body cells from the summer to the winter level. It also becomes more active during periods of special stress such as puberty and pregnancy. The active principle of the gland is thyroxine, which contains about 65 per cent of iodine. Its chief function is that of control of normal metabolism or oxidation of the body tissues. The normal functioning of this gland is of paramount importance to us in orthodontics, because of its direct bearing on growth and development.

PATHOLOGY OF THE THYROID GLAND

Iodine deficiency in the soil appears to be one of the major causative factors of hypothyroidism and is reflected in the ingestion of foodstuffs and drinking water with a low iodine content. In childhood a hypofunction of the gland causes cretinism, the patient appearing misshapen with a potbelly and a thick protruding tongue. The skin is characteristically dry and cold to the touch. The hair is harsh and brittle and the hands broad and stumpy. The lips are thick and prominent and the dentitions are retarded. The nose usually has a typical saddle shape. Intelligence grades from feeble-mindedness to complete idiocy. The possibility of thyroid deficiency should never be overlooked in the mentally retarded patient. Remarkable response to thyroid medication in young patients is revealed in skeletal development, accelerated tooth eruption, and a marked improvement in mentality. Thyroid deficiency may also make its first appearance in adult years, the greatest known incidence being between the ages of 35 and 50. One of the most characteristic features of the disease is the patient's marked sensitiveness to cold and a failure of the mental faculties. An early diagnosis of thyroid deficiency is imperative, for it is particularly responsive to treatment in young children. The basal metabolic rate is one of the most valuable diagnostic aids. It is indeed gratifying to see the child removed from the ranks of the mentally and physically retarded and placed on the way to normal growth and development. Of all endocrine dysfunctions, hypothyroidism is probably the most responsive to medication. (Figs. 3 and 4.)

Fig. 3 illustrates a typical cretin. This patient when first seen at 10 years, 6 months of age was only beginnnig to walk, and was unable to talk. Her stature was approximately that of a 2-year-old child, and her mental age was about that of a 1-year-old. There was a characteristic lack of bone mineralization. The patient was administered one grain of thyroid daily. During a period of three and one-half years under this medication, she grew the equivalent of 190 per cent of the normal. Bone age advanced about 10 years during this period of time, as will also be noted in Fig. 3. Mental age, though improved, still lagged behind physical development.

Fig. 4 is a graphic illustration of a patient having juvenile hypothyroidism. In the original photograph (left), the patient is 10 years of age, while her normal sister (right) is 6 years of age. In subsequent photographs taken during the administration of thyroid (one to one and one-half grains daily) at 6 months, 18 months, 3, 4, and 5 years, the patient is always on the left, and the untreated, normal sister is on the right. The patient grew several hundred per cent over the normal for the first year or two and then gradually settled down to a normal

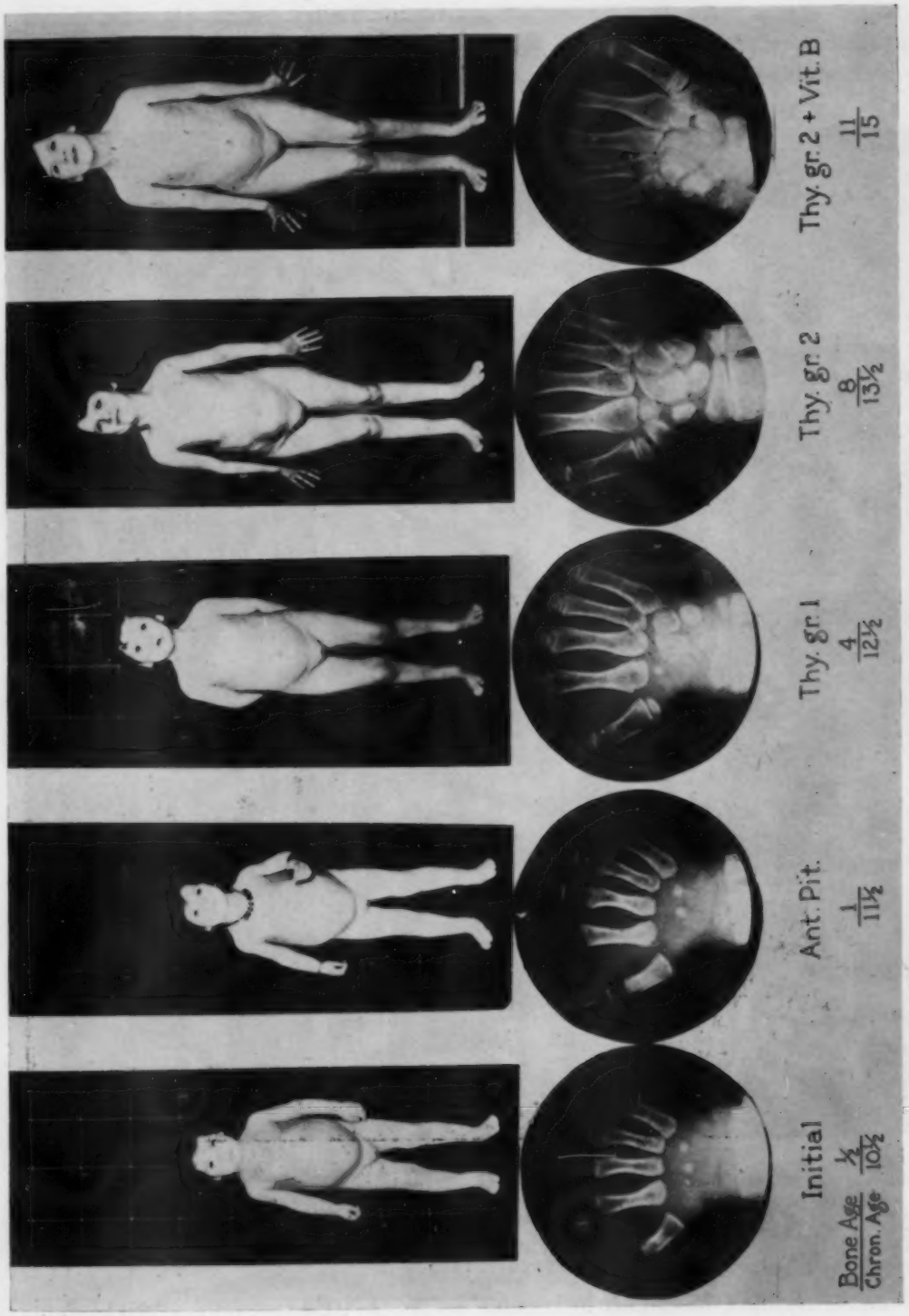


Fig. 3.—Growth and development (H. J.). A cretin, aged 10 years, 6 months, bone age, 6 months at inception of treatment. Note rapid growth and unfolding of carpal index under thyroid medication. (Courtesy of Dr. E. K. Shelton.)

annual increment. Note that when she reached adolescence she shot ahead of her younger sister. The intelligence improved markedly, but a hypothyroid or myxedematous child of 10 years who has never received thyroid has in most

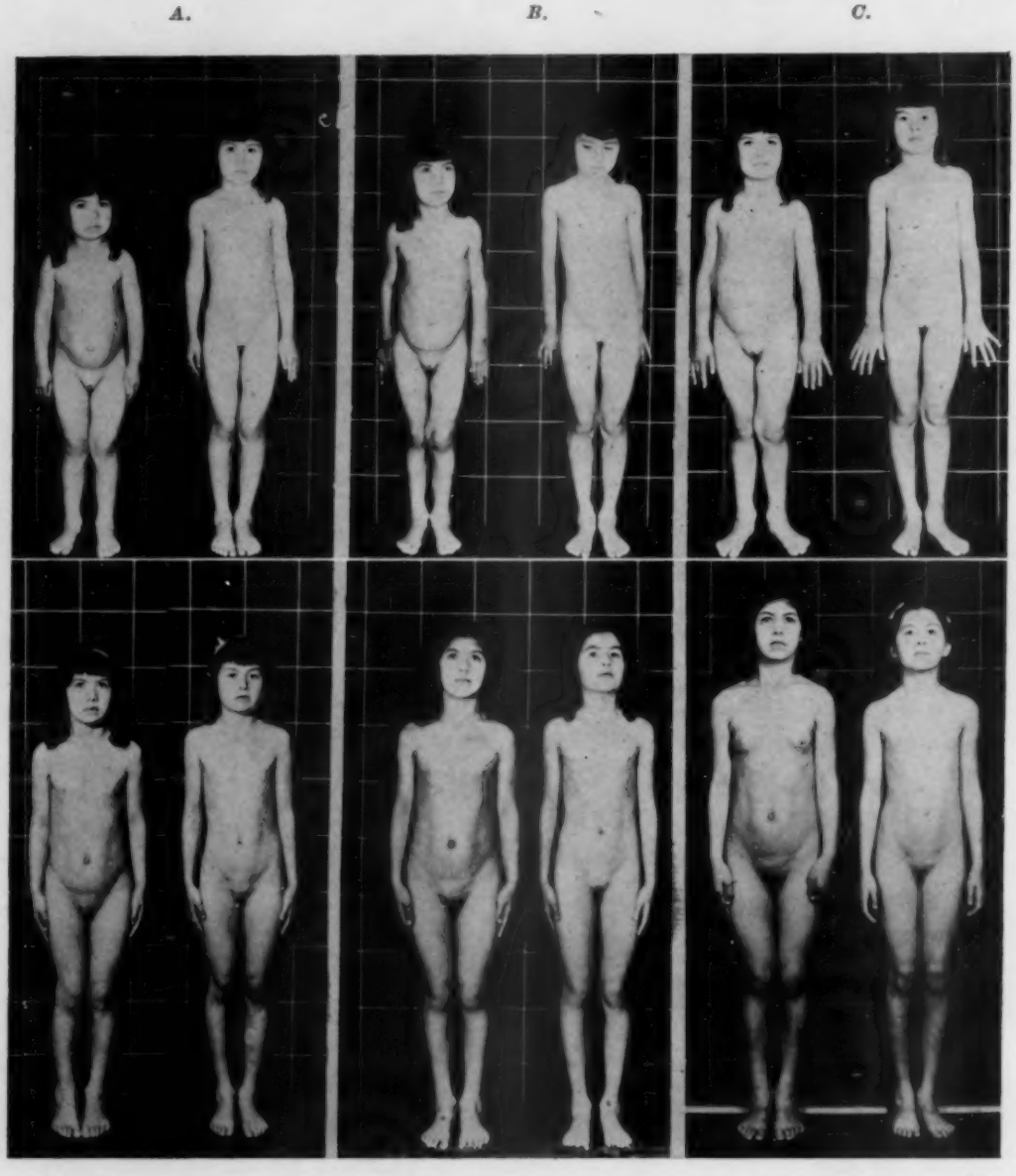


Fig. 4.—Two sisters. *A*, Original photograph—left is patient 10 years of age, while her normal sister, right, is 6 years old; *B*, after six months; *C*, after eighteen months; *D*, after three years; *E*, after four years; *F*, after five years. Note rapid growth under thyroid medication. At 16 years of age the patient had exceeded her younger sister in height. (Courtesy of Shelton, E. K.: Endocrinology **30**: 1000-1014, 1942.)

instances suffered permanent damage to the central nervous system. This patient managed to keep abreast of her normal sister in school after two years on thyroid treatment. Note that at the end of five years under endocrine medication the patient is taller than her sister.

Colloid goiter, sometimes referred to as adolescent goiter, is another manifestation of hypothyroidism, and is most prevalent in certain parts of the United States, such as the Great Lakes and the Mississippi Valley. The basal metabolic rate is usually minus 15 to minus 20. In young patients, the disorder is readily remedied by the addition of iodine to the table salt.

Hermann Becks of San Francisco has done much investigation concerning patients whose teeth exhibit considerable root resorption, and has attempted to correlate this with systemic disturbances, more particularly hypothyroidism. He was able to prove that there were almost an equal number of patients having root resorption with no previous history of orthodontic treatment as there were of those who had undergone orthodontics. Obviously, we have been unjustifiably maligned in respect to root resorption. When the dental x-ray exhibits this condition, however, an endocrine check-up is indicated.

HYPERTHYROIDISM

This may be caused by an overmedication of thyroid or a spontaneous overactivity of the thyroid gland. Its chief manifestations are an increased nervous tension, an accelerated pulse rate, a loss of body weight, and, in extreme hyperthyroidism, a protrusion of the eyes, giving the disease the name of exophthalmic goiter. The neck is enlarged due to the increase in size of the gland. Calcium is found to be excreted abnormally, producing a depletion of this salt in the skeleton. The most effective treatment is the surgical removal of sufficient gland tissue to bring the basal metabolic rate down to normal. To quote R. G. Hoskins, *The Tides of Life:* "We are what we are in no small measure by virtue of our thyroid glands. Our development before birth, and through infancy depends upon its functional integrity."

THE PARATHYROID GLANDS

These particular glands have a very definite significance to the orthodontist, because in normal function they maintain the calcium content of the blood, which is 10 mg. per 100 c.c. They are four in number, located on either side of the thyroid gland. The parathyroid secretion operates the calcium equilibrium of the blood apparently by controlling the absorption of this element from the alimentary tract.

PATHOLOGY OF THE PARATHYROID GLANDS

The chief manifestation of hypoparathyroidism is that of acute tetany, which is frequently followed by death. The blood calcium may drop from 10 to as low as 6 mg. per 100 c.c.

In hyperparathyroidism, which is an oversecretion of the gland, the condition develops which is known as osteoporosis, osteitis fibrosa cystica, or von Recklinghausen's disease. Due to the marked demineralization of the osseous structures of the body, the bones become soft and deformities of the skeleton occur. It is not unusual in advanced stages of the disease to find the patient's stature reduced by many inches, this being caused by a telescoping of the spinal column. Tumors develop in the bone, and fractures, therefore, may

readily occur. Anemia and loss of muscular tonicity also frequently occur. The blood calcium is abnormally high at first, and the phosphates are low. Both elements, however, are excreted in undue amounts with ultimate severe deficits of both. Radiographic examination of the bone shows extensive rarefied areas, or even some replacement of the bone by cysts. Probably it could be most aptly described as having a moth-eaten appearance. A recognition of this disturbance of the normal architecture of the bone which is apparent in a good dental x-ray makes it possible at times to detect this disease in its incipiency, when there are no evident physical or clinical manifestations.

CALCIUM METABOLISM AND THE TEETH

Because of the relationship of the parathyroid gland to calcium metabolism, may I at this point in my paper correct a misapprehension which still apparently exists in both the medical and dental professions. The teeth have been found to be much more highly specialized than the bones of the body, and the adult tooth when completely calcified is never decalcified during pregnancy or lactation. Albright, Aub, and Bauer, from a radiographic study of the jaws of patients with parathyroid tumors, a condition known to drain calcium from the body, concluded, "The teeth do not take part in the generalized decalcification. They may fall out because of disease of the jaws, but they themselves remain well calcified. This is brought out strikingly in roentgenographs in which the well calcified teeth stand out sharply against the poorly calcified jaws." In contrast to the stability of the adult tooth, an entirely different situation exists in young patients where calcification of the teeth is incomplete. In such instances, the demineralization of the skeleton definitely prevents normal tooth calcification. Strock reported the following changes in the jaws of patients suffering from hyperparathyroidism:

1. Intraoral films show a marked change in the architectural pattern of the bony trabeculae.
2. The entire mandible becomes osteoporotic and cystic, both unilocular and multilocular.
3. As the result of these bone changes, drifting of the teeth occurs, and malocclusions subsequently develop.

THE GONADS

The gonads consist of the ovaries in the female and the testes in the male. They are concerned with elaboration of the ovum and the sperm, and an endocrine function which secretes hormones controlling growth and development of the sex organs. Normally at the inception of puberty brought on by the gonadal secretions, active growth stops. There is a closure of the epiphysis, a change of voice in the male, and a beginning of the menstrual cycle in the female.

PATHOLOGY OF THE GONADS

The deficiency of the hormone secretion produces hypogonadism, resulting in immaturity of the patient and a failure of the epiphysis to close. This causes a eunuchoid type of gigantism in contrast to the gigantism of hyperpituitarism.

The gonadal hormones are growth regulators and inhibit the action of the pituitary growth hormones. The latter controls the rate of growth of the body, and the former regulates the duration of growth. One of the dental manifestations of hypogonadism is the tardy eruption of the teeth.

The increased secretion of the hormone found in hypergonadism may be due to an adrenal tumor. The ensuing disturbances are naturally the opposite of the hypo condition of the gland, causing precocious puberty and an increase in growth and development. There is also an acceleration of all maturation processes. Ossification centers are sometimes advanced several years over the patient's chronological age. Tooth development, although advanced, is apparently not as accelerated as is the carpal index.

Since pregnancy involves a disturbance of the gonads, I should like to mention briefly the relation of dental caries to this condition. There is still a misconception in the minds of the profession and the laity concerning this. The erroneous statement of the effects of pregnancy upon the dentition has been so frequently repeated by the dentist that, scientific evidence to the contrary, the opinion still exists that rampant caries is an accompaniment of pregnancy. It is true that the bones are storehouses of calcium upon which the body may draw when needed, and the teeth have erroneously been placed in this category. The enamel of the tooth is a nonfunctional tissue and is unable to give up its calcium. Ziskin in his article on the incidence of dental caries in pregnant women, published in the American Journal of Obstetrics and Gynecology, November, 1926, proved that caries is no more prevalent in pregnant than in nonpregnant women. Should there be an increase in the number of caries during this period, it can usually be traced to a combination of circumstances, namely poor mouth hygiene in conjunction with sordes and acid metabolites resulting from the nausea and vomiting existent at this time. To quote Schour, "Let us eliminate for once and for all this false myth of the loss of a tooth for every child."

THE CARPAL INDEX

I should like to turn momentarily to a consideration of the carpal index. Engelbach and McMahon did much of the original work in 1925 to prove that x-ray pictures of the wrist revealed, by the size and number of the carpal bones, information of valuable diagnostic aid in respect to the patient's growth and development. These pictures bear a particular relation to the thyroid and pituitary glands. A marked tardiness in the number of centers of ossification in the wrist is usually accompanied by a tardiness in the development of the dentitions. We as orthodontists are fully aware of the importance of the normal eruption of the deciduous dentition and its gradual resorption as the permanent dentition erupts. Thus, at certain chronological ages, we look for the loss of certain teeth and the appearance of their permanent successors. When a child presents at the office with an unusual interruption in this cycle of the dentitions, we may justifiably suspect some endocrine or metabolic disturbance. Certainly as an indication of the child's normal growth and development, something of cardinal importance to us, roentgenograms of the wrist seem eminently suitable for observation (Fig. 5).

The late T. Wingate Todd, former professor of anatomy at Western Reserve University, has given us an excellent standard of comparison in his *Atlas of Skeletal Maturation.* After a painstaking study of the hands of some thousands

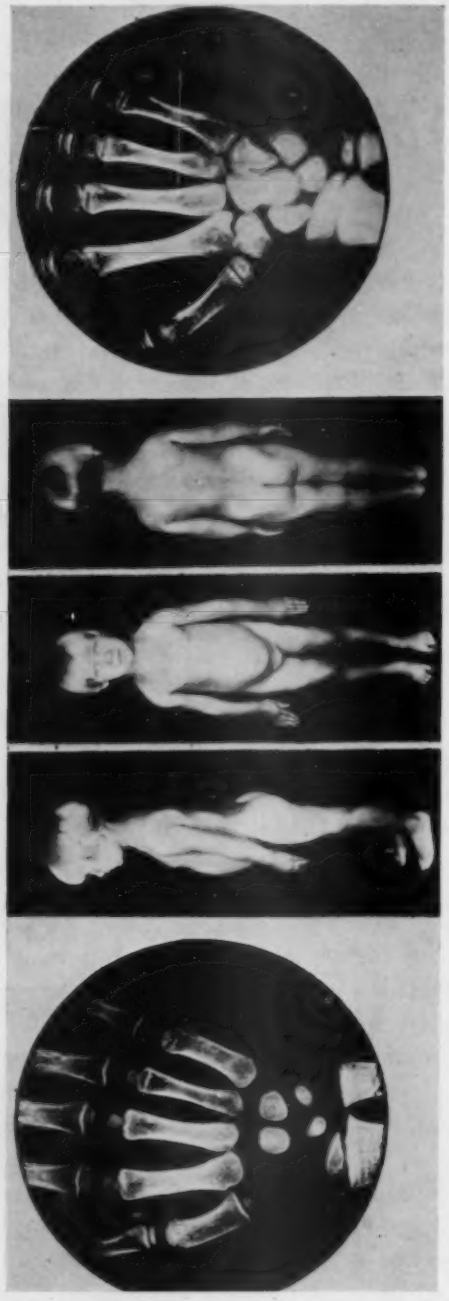


Fig. 5.—J. S. Carpal development at inception of treatment compared to the approximate normal for the age (8 years, 2 months), a retardation of about four years. Stature about that of a 4-year-old child. (Courtesy of Shelton, E. K.: Endocrinology **30**: 1000-1014, 1942.)

of school children in Cleveland, he chose a representative group which he considered approximated the normal as closely as possible. He has in chronological sequence a series of excellent reproductions of wrist x-rays ranging in the male from 3 months to 18 years and in the female from 3 months to 16 years, 3 months.

These pictures are readily taken in one's office or may be obtained from the x-ray technician. The *Atlas of Skeletal Maturation* may then be used as the standard of normality.

Dr. E. Kost Shelton, of Westwood, California, has some examples of osseous development in relation to metabolism which are significant. The following is a case report from his file:

> Female patient, 8 years, 3 months of age, whose chief complaints were a lack of mental development, stunted growth, and painful joints. At the age of four, a diagnosis of rickets was made. Juvenile hypothyroidism was suspected due to the dry, sallow skin, heavy expression, and slow deliberate speech.

To illustrate her lack of normal development, she was unable to dress at 8 years of age and had advanced no further than the kindergarten. There was no history of thyroid or other endocrinopathy in the family. It is to be noted that all teeth were deciduous, even at an age beyond 8 years. They were crowded and carious, a not infrequent accompaniment of hypothyroidism. Of paramount importance to us as orthodontists is also the fact that wrist roentgenograms showed only four carpal centers (a retardation of approximately four years in bone age) (Fig. 5). The sella turcica was normal.

Treatment: The patient was given one grain of thyroid daily, and this was eventually increased to two grains. The permanent teeth started to erupt within four months. The carpal index advanced rapidly, there being a gain of at least three years in the first year of treatment (Fig. 6). During this period there was also a gain of 4.7 inches in height and 13 pounds in weight (Fig. 7). This is an excellent illustration of the response in young patients to thyroid medication.

Dr. Benjamin Tager brings up an excellent point on the intelligent use of wrist pictures as an aid to orthodontic diagnosis. He points out the fact that unless there is an extreme lag in the carpal index when the first pictures are taken, there is no significance to be attached to this deviation from the normal, there being a reasonable latitude permissible in young children of the same chronological age. The particular value of these pictures is in their comparative study. In young and growing children there should be a marked development of these centers of ossification. Therefore, the original pictures should be followed by those taken at intervals of approximately six months. A failure of development as revealed by reference to the original establishes an individual norm for the patient, and provides valuable data on the child's rate of growth and development.

The case histories of two orthodontic patients will now be given in some detail because of the endocrinopathies existent.

In the first one to be described, the patient presented at the Orthodontic Department of the College of Dentistry, U. S. C., requesting treatment in May of 1938. Due to his endocrine history and his gross malocclusion, he had been refused treatment by several orthodontists who had been consulted previously by his parents. All were apparently of the unanimous opinion that the prognosis

of orthodontic treatment was unfavorable, as well they might be in the light of his medical history. His malocclusion was an extreme maxillary protraction and mandibular retraction. There also existed a lack of vertical development, and the mandibular incisors were traumatizing the palatal tissue. The patient had a history of chronic gingivitis, partly attributable to his physical condition and partly due to his lack of mouth hygiene.

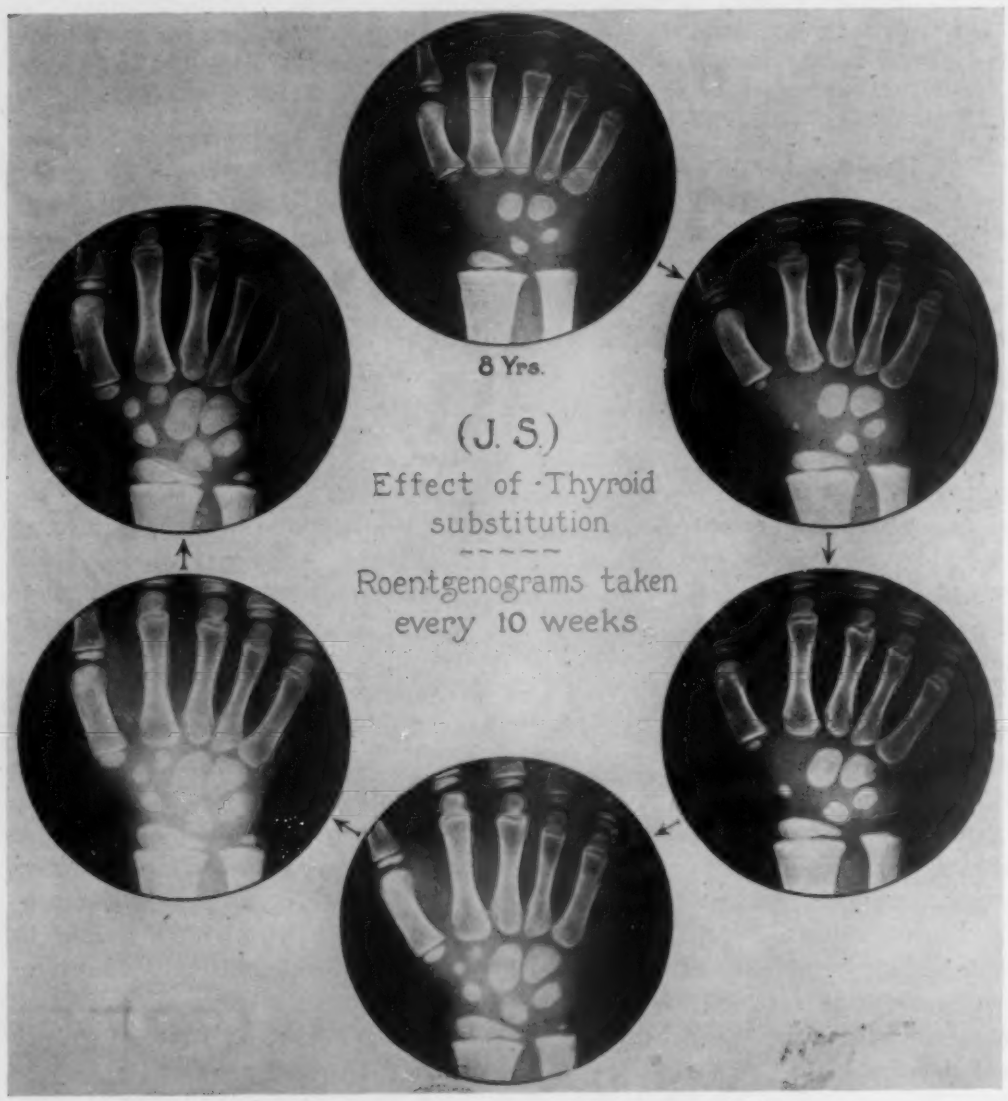
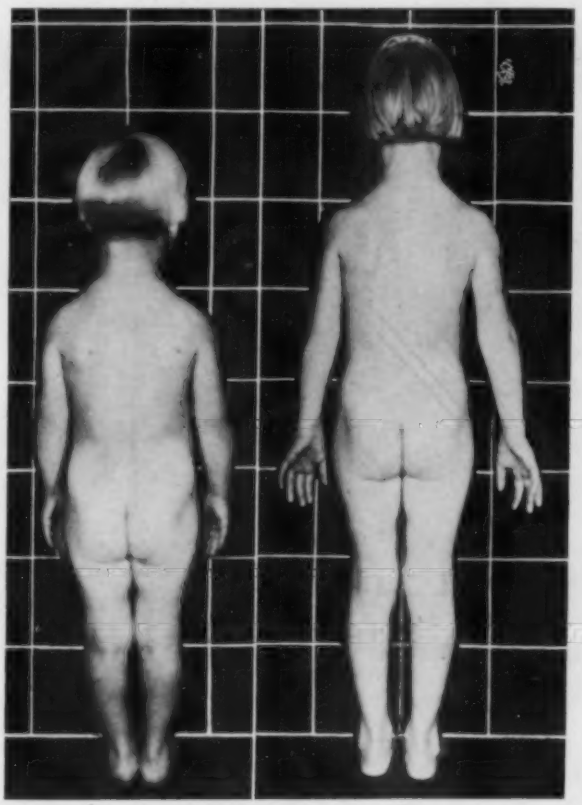


Fig. 6.—J. S. Rapid development of the carpal centers during first year of treatment on a small dosage of thyroid. (Courtesy of Shelton, E. K.: Endocrinology 30: 1000-1014, 1942.)

Early history: The patient was apparently a normal, healthy child until the age of 5. There was a normal eruption of the deciduous dentition. He had the usual childhood diseases of chicken pox, measles, and diphtheria. The father, mother, and one sister are all living and well, and have no significant history

which would account for the pathology which eventually developed in the child. Starting at 6 years of age and continuing until 9, a disturbance in growth developed, as did also increasingly severe headaches. The latter were of considerable significance in the light of what was to follow. The patient became lethargic, lost weight rapidly, and was unable to retain any food. He was taken to the Mayo Institute in Rochester, Minnesota, with this diagnosis:

> J. R. was examined at the Mayo Clinic in July of 1928, and had evidence of a supracellar cyst. A transfrontal exploration was performed and an aspiration of the cyst and removal of the tumor were carried out. The cyst represented a Rathke pouch cyst.



A. *B.*

Fig. 7.—J. S. At inception of treatment and a year later. A gain of 4.7 inches in height and 13 pounds in weight. (Courtesy of Shelton, E. K.: Endocrinology **30**: 1000-1014, 1942.)

The anterior portion of the pituitary gland controlling growth and sexual maturity arises from this pouch, and thus, in the removal of the tumor, the major portion of this lobe was removed. After the surgery was performed, the patient's general condition improved and his severe headaches disappeared. Several years later, at the age of 17, he was taken to the neurological clinic of the Los Angeles County Hospital, and the following observations were made:

> A retarded sexual development, small genitalia, pea-sized testes, and no evidence of pubic hair. Patient obese about the abdomen and hips, with prominent breasts, and pubic deposits of fat.

In other words, all the evidences of juvenile hypothyroidism existed, with the accompanying development of female characteristics due to lack of normal sexual maturity. The diagnosis given was a pituitary deficiency, related to the partial destruction of the anterior lobe of the pituitary gland. He was then referred to Dr. Clifford Wright of the Out-patient Department of Endocrinology, Los Angeles County Hospital, and was given 5 c.c. antuitrin sex and growth hormone three times per week. This was continued from July of 1935 to July of 1937. The response to endocrine treatment was not very satisfactory. His weight increased fourteen pounds during this time, and his height increased two inches. However, the body proportions were abnormal, and there was no response whatsoever as far as sexual maturity was concerned (Fig. 8). His

Fig. 8.—J. R. Note long, slender, tapering fingers, a characteristic frequently observed in hypopituitarism.

epiphyses, which should be closing at this age, were still open. He was retarded mentally, having a mental age of about an 8-year-old child, his chronological age being 17. This, then, was the picture of the patient as he presented with his parents, who asked for a correction of the malocclusion. From this history of the case, as just described, there was no reason to believe that a favorable response could be expected from orthodontic intervention. Only the impassioned and tearful pleas of the parents and an obsession by the patient, despite his low mentality, to have his teeth straightened, induced us reluctantly to undertake the case (Figs. 9 and 10). The parents were naturally promised nothing in the way of results. A full-banded Universal appliance was used. In the maxillary arch the first premolars removed, this compromise being made because the mandibular arch provided insufficient anchorage to retract the extreme upper protraction in its entirety. Considerable width of the lateral segments in both the maxillary and mandibular arches was accomplished (Figs. 11 and 12). The

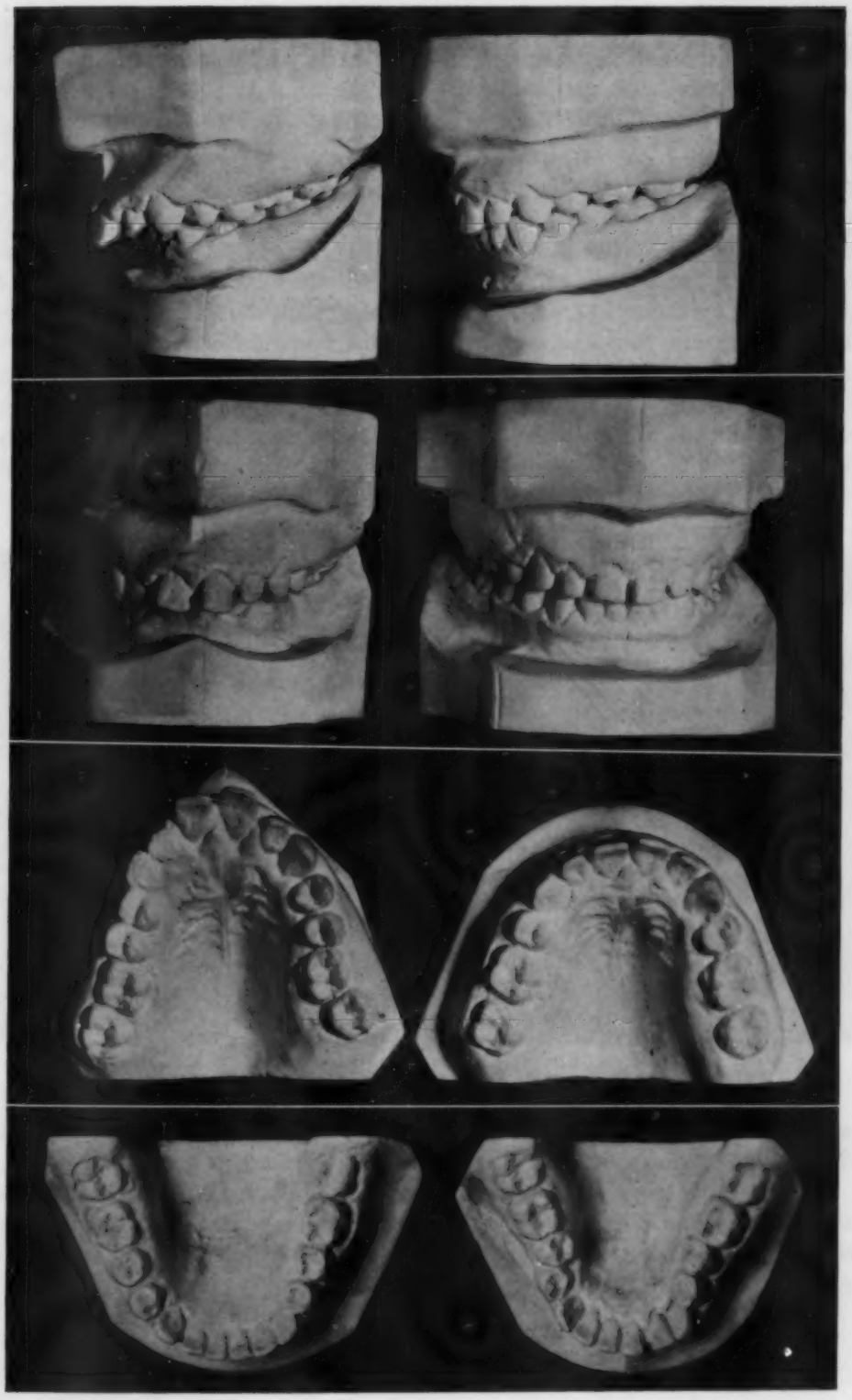


Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 9.—J. R. Dentition at inception and termination of treatment.
Fig. 10.—J. R. Front view.
Fig. 11.—J. R. Occlusal view (maxillary) at inception and termination of treatment.
Fig. 12.—J. R. Occlusal view (mandibular) at inception and termination of treatment.

duration of orthodontic treatment was just under two years. Investing structures were healthier in appearance than they had ever been despite the amount of tooth movement. The patient also no longer traumatized his palate. From the results obtained, I think the orthodontic treatment was justified.

The next case to be presented also has an endocrine background, and illustrates the response obtainable by orthodontic treatment when supplemented by hormone medication. The patient was first seen at the College of Dentistry, University of Southern California, in August of 1938, by Dr. G. Y. Nagamoto, at that time a member of the staff of the graduate school of orthodontics. He instituted the orthodontic treatment and continued it until his departure from California. It was then continued by your essayist until the induction of the patient into the Army, which prevented carrying the case to its desired termination. He presented a pathetic figure, having an extremely underdeveloped mandible and a protracted maxilla (Fig. 13). To add to his deformity, he had an abnormally large nose which seemed to exaggerate his lack of mandibular development. Moreover, he was underweight and underheight for his age of 14.

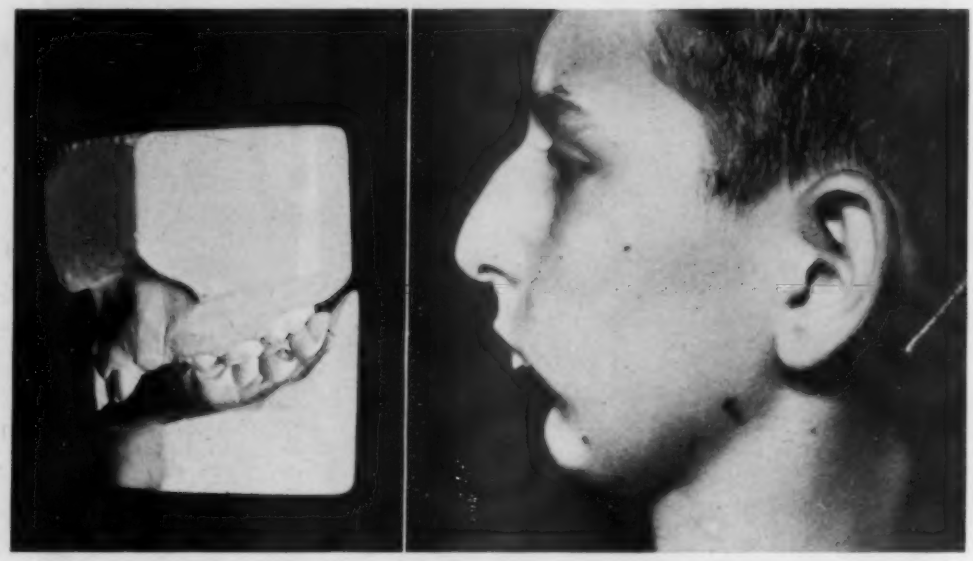


Fig. 13.—J. P. Profile at inception of treatment and lateral view of dentition.

The length of treatment time is explainable by the great amount of mandibular development necessary, and the very gentle forces used to accomplish this with safety. Again in this instance, a full-banded Universal appliance was used. Treatment continued for three years and then, because the patient's growth obviously lagged, the decision was made to have an endocrine examination. Dr. Clifford Wright gave the following diagnosis:

1. A basal metabolic rate of –17.
2. No pubic hair present.
3. A bone age of 10 years in comparison to his chronological age of 14 years, 6 months.

Recommendations were as follows:

1. ¼ gr. of thyroid daily to be increased to tolerance.

2. Intramuscular injections of Squibb's growth hormone, starting with 1 c.c. twice per week, to be increased gradually to 3 c.c. per week.

The patient's response to this medication was as follows: an increase in weight of nine pounds and an increase in height of 2.5 inches in one year. Thus, the results were much more gratifying in this than in the previous patient. Orthodontics continued, and in January of 1940 it was decided that the maxillary first premolars should be extracted. The case was stripped in January of 1943 and retained because of army induction.

Fig. 14 illustrates the malocclusion at the inception of treatment and when it was terminated and retained. Note the reduction of the maxillary protraction and the increased vertical development.

Fig. 15 illustrates the maxillary arch. Note that the first premolars have been removed.

Fig. 16 portrays the degree of mandibular development obtained.

Fig. 17 is a composite photograph depicting the improvement in profile harmony as the case progressed.

The prognosis of this malocclusion was obviously unfavorable, even without the existence of some endocrine dysfunction, and with that added to the picture, the orthodontist could be justifiably pessimistic about its outcome even to the point of refusing to take the case. One cannot quote isolated examples to be used as illustrations of what orthodontic intervention may accomplish for patients with glandular disturbances.

Your essayist, however, readily admits having much less favorable response to tooth movement in some patients with an excellent background of health. Thus, by observation, metabolic disturbances have been detected and the aid of the endocrinologist enlisted. Surely these patients have been immeasurably benefited, thanks to the assistance and cooperation of the men in endocrine medicine.

For the following data I am indebted to Dr. E. Kost Shelton, of the Shelton Clinic, Westwood, California, who has compiled this as an aid to the orthodontist.

1. Physical signs as seen in the dental chair that may point to endocrine or metabolic disturbances:
   - A. Personality of the Patient
     1. Overactivity or hyperirritability (hyperthyroidism)
     2. Underactivity or apathy (hypothyroidism)
     3. Mental retardation (hypothyroidism)
   - B. Weight
     1. Marked overweight for age (hypothyroidism, hypopituitarism)
     2. Marked underweight for age (hyperthyroidism)
   - C. Height
     1. Marked overheight for age (hyperpituitarism, hypergonadism)

Fig. 14.

Fig. 15.

Fig. 16.

Fig. 14.—J. P. Front view before and after treatment.
Fig. 15.—J. P. Occlusal view (maxillary) at beginning of treatment and at termination.
Fig. 16.—J. P. Occlusal view (mandibular) at beginning of treatment and at termination.

Fig. 17.—J. P. Series of four profiles about two years apart showing mandibular development. *A*, Original photostatic picture; *B*, about one and one-half years later; *C*, approximately three and one-half years from inception of treatment; *D*, at termination. Note here that plastic surgery has been performed on the nose.

2. Marked underheight for age (hypopituitarism, hypothyroidism, hypogonadism)

D. Configuration
Abnormal fat distribution such as is seen in Fröhlich's Syndrome, in hypopituitarism.

E. Skin
Marked deviation of normalcy in temperature, moisture, pigmentation.

F. Hair
Abnormal distribution on face, chin, arms, and body.

G. Eyes
Protruding or slanting eyes, irritated lids.

H. Nose
Under- or overdeveloped.

I. Extremities
Abnormally large or small hands. Abnormally long or short fingers. Tremor of fingers.

J. Mouth
Precocious eruption of teeth, tardy eruption of teeth, rampant caries, abnormal spacing, prognathism, rarefied alveolar bone.

K. Neck
Enlarged thyroid; presence of scars.

2. History that may be casually elicited from the patient by the orthodontist pointing to endocrine or metabolic disturbances:

A. Surgical Operations on the Neck, Evidenced by Scars

B. Developmental
Growth and development in childhood (normal or abnormal). Onset of puberty and menstruation.

C. Marked Increase or Decrease in Appetite
Excessive thirst (diabetes). Intake of food, balanced diet.

D. Occupational History
Exposure to heavy metals such as lead, arsenic, radium, phosphorus, bismuth, and their effect on the oral cavity.

E. Circulatory History
Blood pressure abnormally high or low. A feeling of warmth or cold. Dyspnea or edema.

F. Neuromuscular
Extreme energy or fatigue, weakness, loss of sleep, mental and emotional changes.

To sum up the evidence previously presented, what significance then shall we as orthodontists attach to endocrinopathies. The etiological factors behind the malocclusion of the majority of our patients are unknown, and at best we are treating cases symptomatically. Some men go to the extreme of ascribing all unknown causes to endocrine dysfunction, whereas others choose to ignore this and all other possible systemic conditions. Let us approach this problem, as indeed it is a problem, by taking a sane course between the two extremes. Probably no field of medicine lends itself as readily to quackery as does that of endocrinology, for this is in reality the physiology of the body. Moreover, there are numerous biologic products on the market produced by firms of doubtful reputation. These are used by many practitioners either through lack of integrity or ignorance.

CONCLUSIONS

1. First and foremost, learn the name of a recognized and well-qualified internist who has made a study of the endocrines, to whom you may refer your patients when the need arises.

2. Insist that your patient obtain the desired examination at the office to which you have directed him. A failure on his part to comply with this is justification for your refusing to accept him for orthodontic treatment.

3. Be observant of the patient's physical appearance as he sits in your chair.

4. Obtain adequate data on the patient's past medical history.

5. Insist on good dental x-rays. Unfortunately, the average dental practitioner takes pictures which have little or no diagnostic value. They are usually so under- or overexposed or under- or overdeveloped that one cannot possibly see the architectural pattern of the bone. Again, many do not even include the apices of the teeth. How, then, from these may one recognize root resorption, apical involvements, etc.

Finally, may I state my personal opinion, namely, that only a small percentage of our orthodontic patients have an existent endocrine dysfunction. However, they appear in every practice, and it is our responsibility to recognize deviations from the normal in the patient's physical make-up. If the orthodontist continues to insist on treating malocclusions solely from the standpoint of the mechanics of appliances and fails to recognize the underlying biologic factors upon which successful orthodontic intervention depends, in the parlance of the baseball diamond he has two strikes on him before he starts.

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3780 WILSHIRE BOULEVARD.

PLACING ATTACHMENTS ON CHROME ALLOY WIRE WITH POWDERED SOLDER

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ONE of the minor inconveniences in the use of chrome alloy for orthodontic arch wires is that of finding a satisfactory means of joining the necessary attachments to the main wire. Some men prefer to rely upon spot welding, while Tweed[1] and Klein[2] have suggested workable techniques whereby hooks or stops may be attached with a solder of relatively low fusing temperature.

Orthodontists who place their attachments by means of this latter soldering method are generally agreed that the union between the two metal parts is not at all like that between two gold alloys united by solder, and, consequently, one should take pains to get an adequate mechanical attachment of the two parts, using a sufficient bulk of solder to prevent subsequent breakage.

The easiest and most feasible method of soldering attachments to arch wires involves the use of the same flux and the same solder as has been previously used, but with the solder in a different physical form. Instead of melting solder from a wire or strip onto one of the parts, as has been recommended in the past, one may flux the two parts and dip them in powdered solder. The flux will pick up a sufficient quantity of the powdered solder to cover all areas of the two parts which one desires to have covered with solder, provided those parts have been previously fluxed. Fig. 1 shows two wires fluxed and dipped in the powdered solder prior to uniting them over the flame. The easiest method is to dip about 2 mm. of the attachment wire into the flux and use it as an applicator to apply flux to all sides of the arch wire. Both fluxed wires are then dipped in a small mound of the powdered solder so as to pick up solder in the flux. The parts are then simply held together freehand in their proper relationship and carried into or near the flame of the blowpipe for the brief period required to melt the finely divided solder. Since the solder has already been distributed over the two wires in exactly the situation where it is wanted, there is no necessity of attempting to get the solder to go from one wire to the other. The most suitable flame is one about ½ inch in height, with just enough air in the mixture to make a blue flame. Little heating is required, since the finely divided state of the solder makes melting it extremely easy. The presence of the powdered solder in the flux eliminates almost entirely the sputtering of the latter upon heating. Fig. 2 shows five different solder joints made in this way. Care was taken to distribute the solder entirely around the main arch wire before fusing it, and the lowest possible temperature was used to melt the solder. All of the wires used were chrome alloy, with the arch wire 0.022 by 0.028 inch and different sizes of attachment, including a 0.010 round hard steel wire. Only a

From the Division of Orthodontics, College of Dentistry, University of California.

very pale straw color was imparted to the arch wire by the flame; there was no reduction of temper in either wire, even the 0.010 round wire. On the right is a very acceptable tieback hook made by bending an angle at the extreme end of a 0.010 by 0.028 inch hard stainless steel wire and soldering it to the arch wire as described above. This gives the advantage of a large area of contact between the attachments without adding unnecessary bulk. Although we have been using hard stainless steel for these attachments, the technique would work as well with brass or dead soft stainless steel wire. All joints should be polished with a burlew wheel or some other suitable agent to have the arch chemically clean before placing it in the mouth.

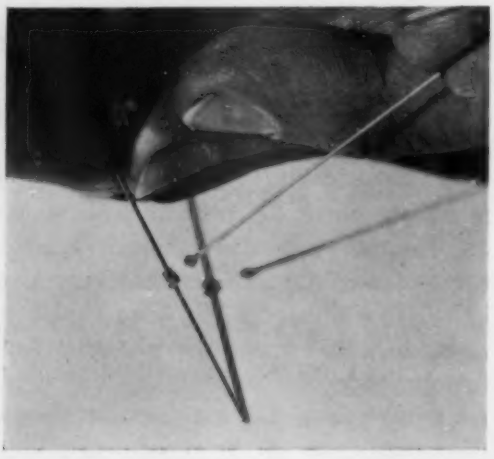

Fig. 1.—The two wires after having been fluxed and dipped in the powdered solder.

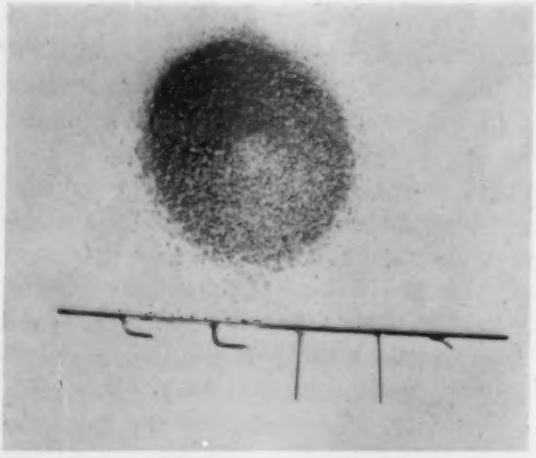

Fig. 2.—Attachments of the following sizes: 0.020 inch round, 0.022 inch round, 0.012 by 0.022 inch, 0.010 inch round, 0.010 by 0.028 inch (all stainless steel) on 0.022 by 0.028 inch stainless. The temper of even the smallest wire is unaffected.

It should be emphasized that since this is essentially the same solder and flux which has been used in the past, once the solder has been melted about the two wires the joint is little different from that produced with previous soldering

methods, and, accordingly, one cannot hope to have this technique reduce the amount of solder required for a secure joint, or in any other way attain some of the advantages of soldering with precious metals. Unions properly made by this technique are at least as strong as the wires themselves, when subjected to laboratory testing procedures. It is common knowledge, however, that soldered joints which will stand almost any laboratory test will break down in the mouth due to electrochemical action. The strength of these joints is enhanced by having as large as possible an area of contact between the parts which are to be joined, by having those areas clean and free from grease before soldering, and in the soldering process, chemically clean by means of proper and adequate fluxing.

The use of powdered solder was suggested by Mr. James Davis of Cleveland, Ohio. The powdered solder is supplied by the Prince and Izant Company, 4501 Prospect Avenue, Cleveland, Ohio.

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The Medical Center.

HOW WE TREAT THE VARIOUS MALOCCLUSIONS AND WHAT APPARATUS WE USE

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IN THIS article I wish to deal briefly with the treatment of malocclusions and to tell what apparatus we can use successfully.

1. Monoblocks and activators made of rubber or acrylic resin, with auxiliary rustless steel springs: We use them on patients whose upper nasolaryngeal passage is absolutely free, who have no vomiting reflexes, and, finally, on those patients whom we can expect to wear them carefully. (Fig. 1.)

These apparatus are put in the mouth in the evening and left there all night. They are taken off in the morning and cleaned with a brush. We recommend that the patient wear the apparatus even by day if possible.

2. Schwarz's apparatus for the upper and lower jaw, made of rubber or acrylic resin, combined with the auxiliary external arch: These apparatus can be used only by patients who have no vomiting reflexes. They are worn day and night. (Fig. 2.)

3. Linguolabial apparatus, modified by Škaloud, for the upper and lower jaw: These are made of one rustless steel wire, which is in its central-bucal part as a passive arch and in its end-lingual parts as an active arch. (Fig. 3.) It is anchored by means of a cylindrical peg in a vertical cannula (i.e., hollow cylinder) of a fixed clasp. This clasp is fixed upon the first molar by cement.

4. Angle's apparatus, for upper and lower jaw, made of rustless steel or platinum-iridium wire: These apparatus consist of clasps with horizontal cannulae, fixed by means of cement upon the first molars, and of an arch provided with screws and female screws, or of a simple arch. An important part of these apparatus is the silk or wire ligatures, by means of which we slowly pull the teeth horizontally or vertically toward the arch.

5. Angle's edgewise arch, modified by Strang, for both jaws, made of rustless steel wire: It is either a simple or quadrangular arch anchored into specially constructed lockets.

6. Mershon's arch for the upper jaw: This apparatus is anchored by means of a vertical locket in a vertical cannula on the lingual side and is provided with tinned springs.

7. The palatal biting plate, made of rubber or acrylic resin, containing a rustless steel holding spring: It can be worn during the night only. It is contraindicated for persons having vomiting reflexes.

8. The sliding rooflet (in Germany, *schiefe ebene*) modified by Škaloud: It is used solely for the lower jaw, with progenia or with retrusion of the front upper teeth. (Fig. 4.)

*Docent of Charle's University of Prague; Director of Orthodontic Department of the 1. Dental Clinic of Prof. Dr. Kostečka.

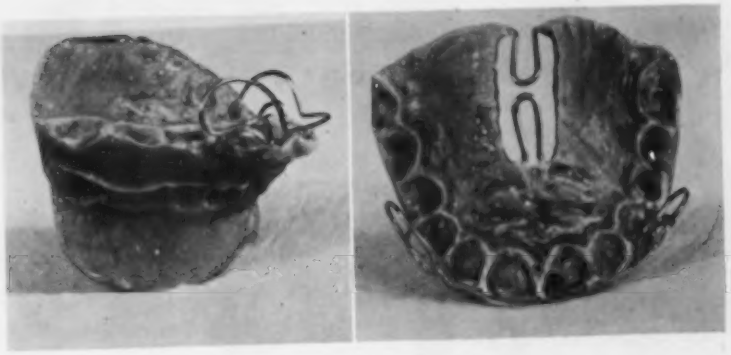
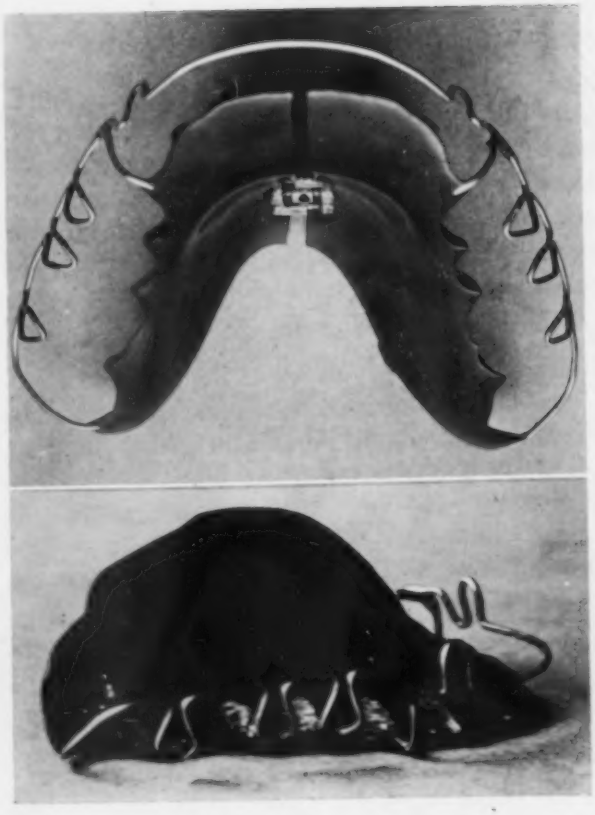


Fig. 1.



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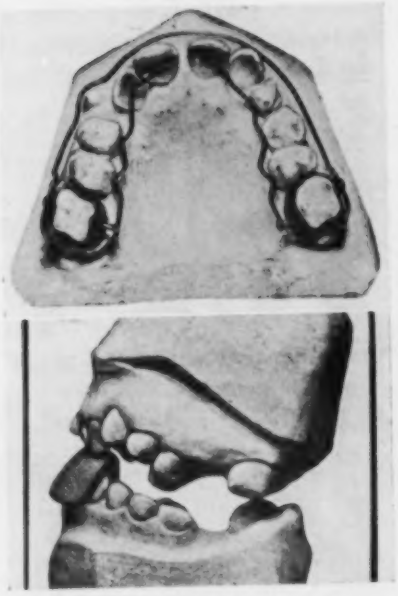

Fig. 4.

9. Apparatus for correcting the diastema between the first incisors composed of by means of silken ligatures, or there is put in these cannulae a contracting spring (Fig. 5).

10. The clasp, modified by Škaloud, made of rustless steel wire: It is used for pulling down retained teeth and fixing them by silk ligatures to the Angle arch. (Fig. 6.)

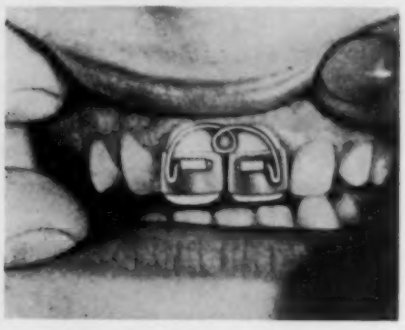

Fig. 5.

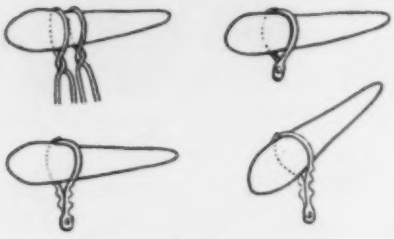

Fig. 6.

ANGLE'S CLASS I

1. Protrusion of incisors with space in the upper jaw: Upon the upper jaw we put a palatal biting plate for elevation of biting and for lowering the front of the lower incisors. Then we grind the plate so that there is, as a result, a space of 1 mm. between this plate and the upper lingual surface of the upper incisors. We activate the holding spring. This activation causes the dorsal pressure upon the incisors, which take up a normal position, and the spaces have vanished.

2. Protrusion of the incisors squeezed together in the upper jaw and the compression in the premolar region. For this compression in both jaws, we put into the mouth an activator with Coffin's springs or Schwarz's apparatus with Tischler's screws. With both these apparatus, be careful about the contraindications mentioned previously. With contraindications and compression on a large scale or together with palatal eruption of the premolars, we use linguolabial apparatus. After correcting these anomalies, it is necessary after having used these linguolabial apparatus to insert a biting palatal plate to prevent relapse. We can use Angle's edgewise arch just as well. With a little compression, we can use Mershon's apparatus.

3 and 4. Protrusion of the incisors in the lower jaw (progenia dentalis) and protrusion of the incisors in the upper jaw usually occur together. If there is no compression in the premolar region, we use monoblock with inserted supporting spring. If there is a contraindication to this apparatus, we put the sliding rooflet (German, *schiefe ebene*) upon the lower teeth.

5. Infraclusion: This anomaly occurs with incisors, canines, premolars, and, sometimes, even with molars, as a rule in the upper and sometimes in the lower jaw. We use Angle's apparatus, pulling it down carefully in an occlusal

way and fixing it with silk ligatures, which are in infraclusion. If there is a compression, we use a linguolabial apparatus with good result, and fix the teeth to its buccal passive arch.

6. Supraclusion: This anomaly occurs with lower incisors, or with upper incisors and canines. We use monoblocks, or, when there is a contraindication, we use biting palatal plates.

7. Palatal eruption occurs with incisors, canines, and premolars of both jaws: When there is enough space between the teeth, we use activators. If there is no space between the teeth, we use Schwarz's apparatus. If this is contraindicated, we use linguolabial apparatus and Angle's edgewise arch. Finally, we can use, even when there is sufficient space between the teeth, a sliding rooflet for the anomaly in the upper jaw.

8. Retrusion: In this group in Angle's Class I belong anomalously placed front teeth in the upper jaw, and we use a sliding rooflet to put them in a normal position.

9. Rotation: We regulate rotation of the teeth either by means of Angle's apparatus, by cementing rings with spines and binding them with silk ligatures to Angle's arch, or by using Angle's edgewise arch. All spring apparatus (e.g., lingual apparatus) failed.

10. Retention: This anomaly occurs as a rule in the canine teeth, central incisors, sometimes even first and second premolars in the upper jaw, and, less often, in the lower jaw in such a way that the whole teeth are surrounded by osseous tissue and have either vertical, horizontal, or oblique position.

If there is enough distance between the teeth, we use Angle's apparatus after surgical treatment of processus alveolaris and after having supplied the tooth with a clasp. We bind the tooth with a clasp by a silk ligature to the Angle arch. If there is not enough distance, we extend it by means of linguolabial apparatus, and we bind a clasp by a silk ligature to its passive arch.

11. Diastema: If this anomaly reaches 4 mm., we correct it by excision of the frenulum labii superioris, and then we bring these teeth together by spring apparatus or by a monoblock equipped with springs for bringing both incisors together. If there is a larger diastema, we must treat processus alveolaris surgically (i.e., the septectomy between the roots).

ANGLE'S CLASS II DISTOCLUSION

1. Protrusion of the upper front teeth without distance and with supraclusion of the lower front teeth and compression in the premolar region: We put into the mouth an activator with Coffin springs or Schwarz's apparatus with Tischler's screws for the upper and lower jaw. The upper apparatus must be provided with a biting plate. If there is a contraindication to these apparatus, we begin with the palatal biting plate and often, after having removed this anomaly, we end the treatment with this palatal biting plate. In the meantime, in order to correct compression, we use either linguolabial apparatus, Angle's edgewise arch, or Mershon's arch for the upper jaw.

2. Protrusion of the upper front teeth with space between them, provided that there are normal-width jaws and supraclusion of the lower front teeth: We use the monoblock and grind the plate off carefully so that there will be 1 mm. distance between this plate and the upper front teeth. We must not, however, grind off too much so that we will not lose the ceiling of the biting plate of the monoblock or the activator for the lower front teeth. By the dorsal pressure, holding spring forces, and the front teeth in a normal position, the distances between them are disappearing. We can also use Schwarz's apparatus without screws. If there is a contraindication to these two apparatus, we must use palatal biting plate first and then linguolabial apparatus without activated lingual parts. Then we must end the treatment again with palatal biting plate, so that relapse would not take place for the upper jaw and for the lower jaw with Schwarz's apparatus without Tischler's screws. Otherwise, we can use Angle's edgewise arch for the whole treatment.

3. Distoclusion with a normal-width upper and lower jaw without protrusion of the front upper teeth: We use monoblock and if it is contraindicated we use a palatal biting plate.

ANGLE'S CLASS III MESIOCLUSION

1. Progenia dentalis and progenia alveolaris: If the jaws are normally wide, or if we cannot use different apparatus with some patients owing to their age, we put the sliding rooflet (German: *schiefe ebene*) on the lower teeth. If there is a compression of both jaws, we choose according to indication either Schwarz's apparatus with Coffin's springs, linguolabial apparatus, or sliding rooflet.

2. Progenia mandibularis: We act in the same way as with progenia dentalis and progenia alveolaris with persons of preschool and school age, and, sometimes, even with juveniles (the extent of anomaly is decisive), we preserve it by means of the rooflet and skull and jaw bandage. Otherwise, we must always recommend the surgical treatment modified by Kostečka.

MORDEX APPARATUS NONOCCLUSION

If there is a combination with distoclusion and mesioclusion, we proceed according to the principles mentioned previously. Angle's apparatus is the most suitable. By means of silk ligatures we correct infraclusion and bring the teeth into a normal position. If there is an anomaly, in juveniles (from 14 to 18 years of age) and in adults we usually recommend surgical treatment modified by Kostečka even if there is a combination with mesioclusion or distoclusion.

HEALTH AND REHABILITATION

Address Given by Major General R. W. Bliss, The Surgeon General, United States Army, at the Award Dinner for General Paul R. Hawley, Sponsored by The National Council on Rehabilitation, March 19, 1948, at 8:00 p.m., in the Waldorf-Astoria Hotel, New York City

IT IS a privilege to participate in this program in honor of a fine gentleman and outstanding fellow medical officer. General Hawley, by virtue of his accomplishments, has rendered our country a service of inestimable value.

I shall present the incidence of disability in our manpower as revealed by selective service examinations during World War II.

Considering the functioning of our federal, state, and local health organizations and the high standards of housing and nutrition throughout the country in general, we are likely to assume that we are a healthy and sturdy people. By comparison with other countries this is largely true. Despite our great efforts and the efficiency of our health agencies, both official and voluntary, the general health status of the American people is still far from ideal.

Lower income groups are contributing a sizable proportion of all children born. Often these families cannot provide the individual health protection and medical care required by these children. There are large areas of the country without organized public health facilities and still larger areas with only partial public health services. There is also considerable evidence that the nutritional status of many of our school children is inadequate for proper physical and mental development. Likewise, the great number of children who appear before juvenile courts each year is proof that there is still much to be accomplished by our homes and schools in the inculcation of proper attitudes and mental adaptability. With these facts in mind it is not difficult to understand the rather depressing situation that came to light during the last war.

The selective service examinations were in a way a crucible in which the physical and mental fitness of our young men was tested and measured. I use the term "measured" with reservation, since the currently available data do not disclose the health status to any close degree, such as do the results of school health examinations which list all physical and mental defects. The selective service examination was designed to achieve principally one purpose. That was to determine which men were physically fit for the rigors of general or limited military service. Hence each individual was measured, or compared, against an arbitrary set of standards and either accepted or rejected. Present selective service data refer only to the rejectees, or those whose infirmities were such that they could not be effectively absorbed into the military organization in any capacity. Many of these men had more than one cause for rejection. But, since failure to meet the acceptable standard in only one instance was required for rejection, that is all that is included in current selective service figures—the principal reason for nonacceptance. Likewise, many correctable or nonincapacitating defects were present in those passed for military service. Another study is now being made to determine the total prevalence of physical and mental defects as determined by these examinations without reference to rejection. However, the results of this study are not yet available, and the data which I am about to present are but rough indices. Only the prevalence of infirmities present in the worst degree is depicted.

The selective service rate of rejection in World War II was alarmingly high. Prior to the cessation of hostilities, 16,000,000 men between the ages of 18 and 38 years were examined. Thirty per cent of these, or 4,828,000, were rejected for mental or physical

defects. Following hostilities, the standard for existing minimum literacy was raised to the equivalent of a fourth grade educational level. Then the rate of rejection increased to 37 per cent. During this period, about one-third of the white registrants and almost 60 per cent of the colored registrants were rejected for physical and mental reasons.

Neuropsychiatric disorders were by far the largest single cause for rejection. During the first four and one-half years, there were 1,846,000 rejections for this cause at induction stations. This constituted about 12 per cent of all those examined and 38 per cent of all rejections for all causes. Psychoneurosis was the principal psychiatric cause among white registrants, while among colored registrants the principal psychiatric disorder was psychopathic personality. The psychoses were the least important in this group. Of course, not all those rejected were unduly handicapped for civilian life, but, on the other hand, all those unsuited for military service were not weeded out. There were one million neuropsychiatric admissions to Army hospitals during the war. There were 382,000 disability discharges for neuropsychiatric reasons, representing 39 per cent of all those discharged for mental and physical defects. However, all these men received maximal benefit from Army hospitalization before discharge, and 80 per cent are now gainfully employed. In addition, there were 163,000 who were discharged administratively, and not for medical reasons, because of inaptness, lack of adaptability, and personality defects. These facts are a shocking indication of the state of our nation's mental health. It has been estimated that two in every 20 adult Americans will need psychiatric help and one in 20 will spend some part of his life in a mental hospital.

The second most important cause for rejections was musculoskeletal defects. There were 935,900 of these, constituting about 6 per cent of all men examined or almost one out of every five rejectees. Within this group severe hernia made up 42 per cent of the total, and pronounced flatfoot, 8 per cent. The remainder consisted of various incapacitating involvements of the bones, joints, or muscles, ranging from amputations of extremities through postpoliomyelitic paralysis to mild arthritis.

The third leading reason for incapacity was disorders of the eye, ear, nose, or throat. These accounted for 30 rejections out of every thousand men examined. Eye defects, including visual defects of severe degree, constituted 51 per cent of these, and ear disorders, principally loss of hearing to a marked degree, 42 per cent.

The fourth cause of importance was cardiovascular disease which accounted for 22 rejections out of every thousand men examined.

The incidence of rejection for other leading infirmities per each thousand men examined was syphilis, 17, pulmonary tuberculosis, 9, gastrointestinal disorders, 8, genitourinary disorders, 7, and respiratory disease, 9. The figure for syphilis does not refer to a homogeneous class. It includes all men found to have the disease through 1942 and not subsequently called up, and after that year only those having cerebrospinal, cardiovascular, or visceral syphilis. Syphilis would have played a greater role had the standard not been lowered.

Thus, to summarize the selective service data, three out of every ten men between 18 and 38 years of age were found to be unfit for military service due to mental or physical reasons. The four leading causes for rejection were mental reasons, present in 12 out of every 100 examined; musculoskeletal in 6 of each 100; eye, ear, nose, or throat disorders in 3 in every 100; and cardiovascular disease in 2 in 100.

Now consider in addition to these rejectees the one million men discharged from military service for disability. The sum is not an encouraging picture of our manpower situation today.

This problem has been taken seriously. There are under study detailed methods for the complete use of manpower in a future emergency. We must consider it from every point of view and on a national scale.

There is hope and reason to believe that a workable system can be devised whereby the physically handicapped may be useful members of both the military and civilian society. To achieve this goal it is essential that a coordinated effort be made to rehabilitate, as far as possible, this great segment of our population.

In Memoriam

FREDERIC T. MURLLESS, JR.

1866-1948

FREDERIC T. MURLLESS, JR., a national figure and pioneer in orthodontics, died Thursday night, March 6, in Hartford, Connecticut.

FREDERIC T. MURLLESS, JR.

Dr. Murlless had been in failing health during the past year. However, he continued to administer to his patients at his office in Hartford. He was a director of the American Board of Orthodontics from 1937 to 1946 and was president of the Board from 1944 to 1946.

More complete information regarding the life and activities of Dr. Murlless will appear in a subsequent issue of the JOURNAL.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Thumb- and Finger-Sucking in Children: By Harry Bakwin, M.D., New York, N. Y., *J. Pediat.* **32**: 99-101, January, 1948.

Many ill effects have been attributed to thumb-sucking. It is said to deform the palate and teeth and to lead to air swallowing, oral infection, and gastrointestinal disturbances. It has been looked upon as a habit related to masturbation.

Thumb-sucking may displace the teeth, and it not infrequently causes callous formation on the thumb. Aside from these, the habit is not known to be harmful. It does not cause deformity of the palate, and air swallowing, oral infection, and gastrointestinal disturbances are no more frequent in thumb-sucking children than in others. It is true that thumb-sucking and masturbation are both habitual manipulations of the body which are pleasurable, but there is no reason to believe that they are otherwise related. Moreover, there are no data to indicate that thumb-sucking children masturbate in later childhood more often than other children.

Thumb-sucking is much less often a cause for dental irregularities than is generally believed. According to the studies of Goldberg[1] on uniovular twins, and the serial studies of Sillman,[2] heredity is by far the most important factor determining dental alignment. The teeth in young children may be readily displaced by pressures of various sorts, but, in general, the teeth displaced in this way are readily replaced or resume their original positions spontaneously when the pressures are released.

Since the habit of thumb-sucking disappears, in the large majority of instances, by the sixth year of life, it only rarely leads to irregularity of the permanent teeth.

The habit of thumb-sucking usually becomes established during the early months of life. Occasionally it begins during the teething period and, rarely, even later in imitation of a younger sibling. If the habit persists after 1 year of age, it is likely to run a long course, disappearing between 2 and 5 years of age. It may persist into adult life.

Associated movements frequently accompany thumb-sucking. The child may pull the ear, pat the head, twist or pull the hair, suck a blanket or diaper, rub the cheek or chin with a blanket, pull a blanket in front of the face, etc. The associated movement may persist after the thumb-sucking has ceased.

Though the thumb is the finger generally preferred for sucking, occasionally other fingers are used.

Tongue-sucking is relatively uncommon. It is seen sometimes when the thumb-sucking is prevented by the use of restraints. It also occurs where there is macroglossia as in Mongolian idiots and cretins and, occasionally, in healthy infants. The habit is harmless and usually disappears during the second year of life.

Of the hypotheses put forward to explain why children suck their fingers, the one by Levy[3] has received widest attention. On the basis of clinical observations as well as investigations in dogs, calves, and chickens, he concluded

that the primary factor causing thumb-sucking is inadequate sucking activity during feeding time. Gesell and Ilg,[4] however, believe that this is only of minor importance. Our experience has been similar. We have frequently seen babies, nursed at the breast and seemingly satisfied in every way, who sucked their thumbs; and we have seen these babies develop later as well-adjusted children.

Throughout life the mouth is used for pleasurable satisfaction. Looked at in this way, thumb-sucking during infancy is no more an undesirable habit than gum-chewing and nail biting in childhood or smoking and munching in adulthood.

Thumb-sucking may cease toward the end of the first year of life, especially when the sucking is associated with feeding, but it often persists. According to Gesell and Ilg[5] it reaches its highest peak between 18 and 21 months of age when some children will sit for hours with thumb in the mouth, either alone or watching other children at play, but not taking part in their activities.

Thumb-sucking is closely associated with sleep, and many children suck the thumb only when falling asleep and during sleep. The 2-year-old child resists removal of the thumb during sleep, the 3-year-old tolerates removal, and the 4-year-old spontaneously drops the thumb during sleep.[5]

Management.—The parents should be instructed as to the harmlessness of thumb-sucking. The relation of the habit to dental alignment and to the permanent dentition should be explained.

The application of mechanical restraints or bitter-tasting substances and adhesive tape to the thumb are to be discouraged. In the first place these devices are unkind. In addition they often rouse the child's negativism and make him resistant. The child may come to suck the thumb in order to attract attention and to annoy the parents.

Censuring, nagging, and shaming should be avoided. They tend to shake the child's faith in himself and make him unsure of parental affection.

Thumb-sucking requires no treatment during infancy or, later on, when it is practiced only in relation to sleep. The handling of the baby should be reviewed with the mother to see that he is held properly during feeding, that he gets an adequate amount of manipulation (but not too much), that the mother knows the baby prefers to be held snugly, not loosely. During early infancy babies may be diverted from sucking the thumb by being supplied with a pacifier. This is a harmless device which can be removed toward the end of the first year without fear of the child's reverting to the thumb.

When thumb-sucking is frequently practiced during the waking hours after the first year of life it means that the child is overfatigued, bored, or unhappy. Treatment should be directed toward correcting the total situation rather than the thumb-sucking. The child should have adequate rest and ample play outlets. An attempt should be made to correct undesirable parental attitudes.

By 5 or 6 years of age the large majority of children are ready to drop the habit. Promise of a reward, an appeal to the child's will power or vanity, having the child himself apply a bitter-tasting substance to the thumb, or wearing gloves as a reminder is often sufficient to terminate the habit.

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Fluoride Medication and Dental Caries. *J. A. M. A.* **135**: 319-320, Oct. 4, 1947.

To the Editor:—I should like to know the current opinion on the use of fluorides in the prevention of dental caries in adults, particularly with reference to "Enziflur" (Ayerst, McKenna and Harrison, 22 East Fortieth Street, New York). The manufacturer does not quote direct evidence and only implies that it is useful, based on studies with children. Also do you believe this preparation is contraindicated in pregnancy?

M.D., Greenwich, Conn.

Answer.—The fluorine-dental caries hypothesis rests on the evidence observed in extensive epidemiologic studies which show that children calcifying their permanent teeth while using a domestic water containing about one part per million of fluoride (F) show only about one third as much dental caries as comparable groups of children using a fluoride-free water. These epidemiologic observations are fully supported by biochemical and animal experimental studies.

The Council on Dental Therapeutics of the American Dental Association in a recent report (*J. Am. Dent. A.* **34**: 213 [Feb. 1] 1947) states, with respect to this matter, "Though probably not dangerous in amounts recommended for daily consumption, fluoride added to diets already high in fluorine content or consumed in areas where water supplies contain significant concentrations of fluorine may constitute a health hazard. This possibility and the inconclusive nature of experimental evidence concerning their effectiveness render synthetic fluoride and fluoride-vitamin preparations for use in the treatment of dental caries not acceptable for inclusion in Accepted Dental Remedies at this time. The Council recognizes that the potential value of scientifically formulated oral fluoride preparations may be established at some future time and will give consideration to further data as they appear."

An editorial in the *Journal of the American Dental Association* **34**: 345 [March 1] 1947) states, in part, "Stream and Beaudet (Inhibition of Dental Caries by Ingestion of Fluoride-Vitamin Tablets, *New York State J. Med.* **45**: 2183 [Oct. 15] 1945) have reported some lessening of caries activity in children receiving daily supplements of 3 mg. of calcium fluoride for periods of six to eight months. This study is not conclusive because it is based on totally inadequate data to support the claims made. Until more convincing data are presented, therefore, the use of fluorides in dentifrices, mouthwashes, tablets and lozenges cannot be recommended."

It would appear, therefore, that at the present time there is no acceptable scientific evidence adequately controlled which would indicate that fluoride tablets taken by adults will or will not reduce the incidence of dental caries.

Congenital Anomalies. *J. A. M. A.* **135**: 809, Nov. 22, 1947.

To the Editor:—A young man with a congenital deformity of one hand plans to be married to an apparently normal girl. She is hesitant because she feels that her children might be deformed. Will this deformity show up in their children? Will this deformity have a tendency for future children to have other congenital anomalies?

M.D., Bode, Iowa.

Answer.—On the basis of the information which has been supplied it is impossible to estimate the probability that a congenital deformity of the hand will reappear in the offspring of the affected individual. The chance that it would appear would depend on the nature of the deformity and the frequency with which it has appeared among the relatives of the affected individual.

The affected person might have a number of children all of whom would be developed normally. On the other hand there is a considerable chance that at least one offspring will be affected. Practically all, if not all, congenital deformities are genetically determined. This is especially obvious in the case of deformities of the extremities.

The recently published two volume book, *Human Genetics*, by R. R. Gates (New York, Macmillan Company, 1946), which lists and describes many human congenital malformations, might be consulted with profit. A considerable section is devoted to malformations of the extremities.

The children of parents who suffer from congenital malformations may exhibit anomalies of development not appearing in their parents. However, there is a very strong tendency for the defect of the parent to reappear in the child. Statistics indicate that there is one chance in two that the defect in the offspring will be that of the parent (Murphy, D. P.: Congenital Malformations: A Study of Parental Characteristics, with Special Reference to the Reproductive Process, Philadelphia, University of Pennsylvania Press, 1940).

News and Notes

Central Section of the American Association of Orthodontists

The regular annual meeting of the Central Section of the American Association of Orthodontists will be held Oct. 25 and 26, 1948, at the Corn Husker Hotel, Lincoln, Nebraska.

European Orthodontic Society

The dates of the meeting of the European Orthodontic Society have been changed to Friday, Saturday, and Monday, July 16, 17, and 19, 1948. The change was made for the convenience of European colleagues and because of the meeting of the American Dental Society of Europe, which will be the following Monday, July 26. It is hoped that many American friends and colleagues will be able to attend.

Inquiries should be sent to the Honorary Secretary,

Mr. L. Russell Marsh
19, Harcourt House,
19, Cavendish Square,
London, W. 1.

or to the Honorary Treasurer,

Dr. O. Henry
11B, Portland Place,
London, W.1.

American Dental Association

A special committee to study the policies and activities of the National Committee of Dentists was named by the Board of Trustees of the American Dental Association at its February meeting in Chicago.

The special committee was instructed to report its findings at the September meeting of the Board for the "purpose of conveying such findings to the House of Delegates at the annual session in September of 1948."

Dr. LeRoy M. Ennis, of Philadelphia, trustee for the Third District, is chairman of the committee. Other members are Dr. J. E. John, Sr., of Roanoke, Virginia, trustee for the fifth District, and Dr. C. S. Foster, of Cedar Rapids, Iowa, trustee for the Tenth District.

Action of the A.D.A. Board of Trustees in ordering a study of the National Committee of Dentists was adopted by unanimous vote of the thirteen trustees, and followed a recommendation of the Board's Committee on Committees which said:

"Owing to the many inquiries which have been received from the officers and members of constituent and component societies regarding the policies and activities of the National Committee of Dentists as they relate to the policies and activities of the American Dental Association, the Committee on Committees is of the opinion that the Board of Trustees should appoint a special committee of three of its members to study the policies and activities of the National Committee of Dentists as they relate to the policies of the American Dental Association and report its findings at the September meeting of the Board for the purpose of conveying such findings to the House of Delegates at the annual session in September of 1948."

This report was signed by Dr. Harold W. Oppice, of Chicago, trustee for the Eighth District, chairman; Dr. Henry Hicks, of Greenwich, Connecticut, trustee for the First District; Dr. Obed H. Moen, of Watertown, Wisconsin, trustee for the Ninth District; and Dr. Robert P. Thomas, of Louisville, Kentucky, for the Sixth District.

In addition to adopting the recommendation as presented by its Committee on Committees, the Board of Trustees also directed that notice of its action be published in *The Journal of the American Dental Association*, and that future inquiries regarding the National Committee of Dentists be answered by quoting the resolution as adopted by the Board of Trustees.

Full approval has been voted to six additional dental schools by the Council on Dental Education of the American Dental Association, it was announced today.

The School of Dental Medicine of Harvard University, at Boston, was added to the Council's list of approved dental schools for the first time.

Five other schools which previously had been granted provisional approval by the Council were voted full approval. They are:

The School of Dentistry of the College of Physicians and Surgeons at San Francisco

The College of Dentistry of Howard University, at Washington, D. C.

The School of Dentistry of Temple University, at Philadelphia

The School of Dentistry of the University of Washington, at Seattle (first two years)

The School of Dentistry of St. Louis University, at St. Louis

As a result of the current action by the Council, thirty dental schools in the United States now have full approval from the American Dental Association. Nine others have provisional approval. Only one dental school in the nation is not on the approved list of the American Dental Association.

Army Doctors Say Mass Hysteria Need Not Follow Atomic Bomb Explosion

If an atom bomb should fall on an American city, the population would be faced with the greatest emergency in its history. But, it is by no means true that the entire population would be wiped out, nor is it true that nothing could be done to help the survivors, according to Army Medical Corps officers who are conducting continuous study of the problem.

There is no presently known method of protecting those in the immediate neighborhood of an atomic bomb when it explodes. Nevertheless, since the Los Alamos experiment opened the Atomic Age, a great deal has been learned about mitigating the secondary effects of ionizing radiation and about protecting survivors who have received less than a lethal dose.

Many lives may be saved by widespread knowledge of therapeutic measures among physicians, and many more by a general understanding of preventive measures which can be taken by the general population.

In a talk made at the Pennsylvania University Hospital, Philadelphia, Col. James P. Cooney of the Army Medical Corps stressed the question of civilian morale. "Mr. and Mrs. America have been so frightened by the information they have received to date, that if a bomb were dropped on one of our cities tomorrow, mass hysteria would probably cause the unnecessary loss of many lives," Colonel Cooney said. "Mr. and Mrs. America have always been ready and willing to do what must be done in an emergency, and will, if properly instructed beforehand, do the right thing under this new kind of stress."

The real difference between ordinary high explosives and atom bombs is the enormous amount of radiant energy produced by the latter—energy covering the whole range of wave lengths from heat waves to million-volt gamma waves.

The radiant energy may be divided into two types: ionizing and nonionizing. The most important type of injury noted in Hiroshima and Nagasaki was, of course, that due to the ionizing component of the radiant energy from the bomb. Four known kinds of penetrating

radiation can be expected within the immediate area of the blast. They are:

First, gamma radiation, which is essentially the same as x-ray. In an atom bomb explosion, however, these are 200,000,000 volt x-rays. They are lethal to anyone within roughly a mile of the blast, do serious damage to those as close as a mile-and-a-half, but their range is limited to approximately two miles. They move with the speed of light and most of them are produced at the instant of explosion.

Second, neutron beams, streams of heavy atomic particles shot out in all directions within a millionth of a second of the explosion. They have slightly less range than gamma rays. Both gamma rays and neutron beams passing through matter such as blood, bone, or flesh produce extensive ionization of the atoms which make up body cells, which results in the breakdown of chemical bonds, causing profound alterations in cellular function. The fact that some kinds of cells, such as certain types of cancer cells, are affected more easily than others is the basis of radiation therapy. Whatever damage is done in this way is instantaneous, although observable symptoms may not appear for some time.

Neutron beams, however, have another effect, new in medical science. Neutrons are captured in elements contained in human cells, producing new elements which are themselves radioactive, and may remain so for a long time.

Third are beta rays, streams of electrons which rarely penetrate the skin and whose effects will be found chiefly on the surface.

Fourth are alpha particles, the nuclei of helium atoms, which do not get through the cornified, or horny tissue, layer of the skin. Because of their low penetrating power, it is not likely that either the beta rays or the alpha particles resulting directly from the explosion will cause fatal injury.

It must be admitted, Army doctors say, that there is not much even a medical man can do about the immediate radiation from an atom bomb explosion. But in such an eventuality the immediate requirement will be for rescue work on a large scale and treatment for fractures, contusions, lacerations, and burns. Here physicians and laymen will be on familiar ground. These kinds of injuries are the same whether produced by an atom bomb or a block buster; they involve no new principles.

Also, some aid may be given to victims of many sorts of secondary radiation dust spread by the explosion, radioactivity caused by neutron captured by atoms, or radioactive spray if the bomb is dropped in water. Against this secondary radiation, various safeguards can be provided, and it is essential that physicians be trained in safety measures. Army, Navy, and Atomic Energy Commission scientists, as well as civilians interested in radiation therapy, are hard at work on the problem, and substantial progress is being made. One important line of research is in the efficacy of blood transfusions, since it has been established that one of the most serious effects of radiation is damage to the blood-forming elements such as the bone marrow. A person tided over until normal function is resumed may be saved.

A major function of the physician after such a disaster would be to act as public health officer. Most food in the affected area would not be unfit for consumption, but it would all have to be surveyed before it could safely be eaten. All the water in the region would probably contain radioactive isotopes, slow poison to anyone drinking it, but research is in progress on methods of removing radioactive substances. Obviously the usual boiling or chlorination would be useless. There is some indication that filtration and other methods can be developed.

Physicians would have a heavy responsibility in supervising the decontamination of not only food and water but of refugees, by means of complete change of clothing, bathing, etc. This requires familiarity with the use of detecting instruments such as the Geiger counter, and a knowledge of the kinds of persistent radiation to be expected. (People escaping from the area where a bomb has exploded may find their wearing apparel sufficiently radioactive to constitute a menace to others.) This problem has already come up in hospitals where patients are being treated with large amounts of radioactive material.

Armed forces medical officers face an even greater responsibility than do civilian physicians, since it may be necessary to send troops into a bombed area either for rescue

work or on tactical operations. A series of intensive courses on the medical aspects of atomic explosion was instituted last May at the Army Medical Center, Washington, D. C. Nearly seven hundred doctors and scientists have been trained there in the fundamentals of radiation hazards, diagnosis and treatment. More than fifty medical schools throughout the country have sent representatives, many of whom are now setting up similar courses in their respective institutions.

Following the bombing of Hiroshima and Nagasaki, much was learned of what symptoms to expect, overt and latent, immediate and delayed. All the results will not be in for years, of course. Great publicity has been given to the possibility of gene mutations which might produce a high percentage of abnormal offspring in generations to come. However, Dr. Shields Warren, Assistant Professor of Pathology at the Harvard Medical School, recently told Army doctors attending the current basic science course at the Army Medical Center, Washington, D. C., that aberrations in the genes and ova of mammals produced by irradiation are usually lethal to the developing embryo, and consequently the result of such irradiation would probably be a higher rate of abortion and miscarriage rather than production of a race of monsters pictured in sensational prophecies.

Besides flash burns from enveloping hot gases, such as result from any powerful explosion, blisters similar to skin burns and sunburn are likely to appear on the skin of atom bomb victims. In Japan, burns and blisters appear to follow a definite pattern, showing up within five minutes on those close to the explosion. At nearly a mile away, they did not show for several hours, and at greater distances, up to about two miles, the appearance of burns and blisters was even longer delayed.

Of the superficial effects perhaps the most alarming is the falling out of the hair. While bound to cause a bad psychological effect, it is due to superficial radiation and is not serious in itself. The hair will return if the patient has not received a lethal dose of radiation.

Immediately after a bomb blast, those in the vicinity who escape immediate death from shock, burns, or falling debris may appear to have suffered no ill effects at first. But within a few hours, victims seriously affected will feel nauseated and start to vomit. This may pass in a day or so. But at the beginning of about the second week when the hair starts to fall out, the feeling of general malaise, experienced in the first few hours, may return, accompanied by fever. There is likely to be bloody diarrhea. Examination will show that the white blood count has fallen to a very low level. Death may come very quickly, or there may be anemia and general debility over a long period with eventual recovery.

Physicians must be prepared to expect such a syndrome and to take nothing for granted about the condition of the patient during the first few days.

There is a parallel in our experience with heavy bombing of cities from the air in World War II. This type of warfare was an innovation, and at first physicians had virtually no information concerning the effect of shock waves of that magnitude on the human body. Scores of people in the neighborhood of bursting bombs died, although they had apparently suffered no injuries. The knowledge of what could be done to save those people was acquired the hard way because medical science had not foreseen such a problem.

The threat of the atom bomb is at least now recognized and we have already a growing body of knowledge which can be mastered while an emergency is still remote.

Notes of Interest

Maxwell S. Fogel, D.D.S., announces the opening of his office for the practice of orthodontics at Suite 907-A Central Medical Building, 1737 Chestnut Street, Philadelphia 3, Pennsylvania, hours by appointment, telephone Locust 7-6744.

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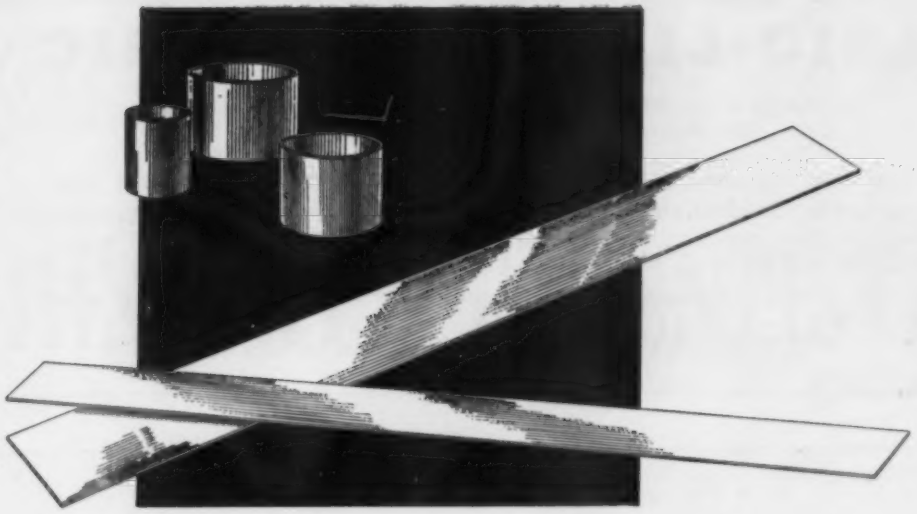

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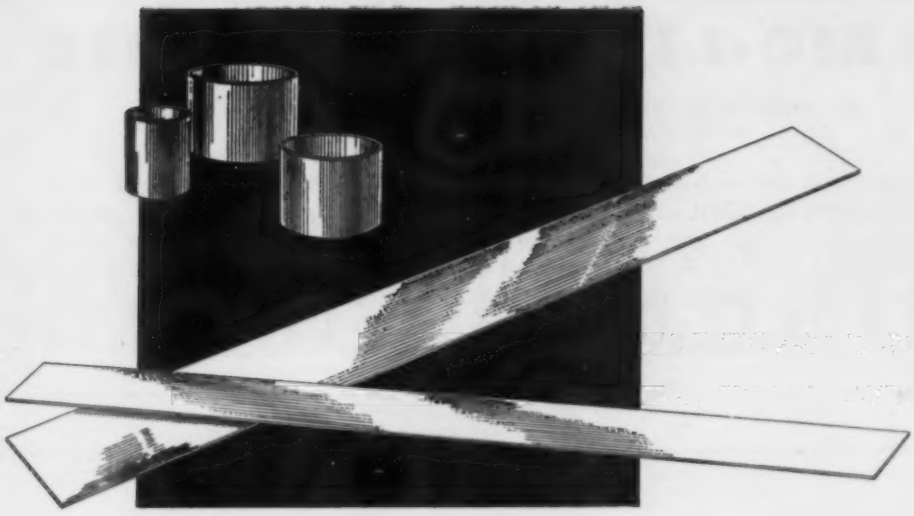

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